

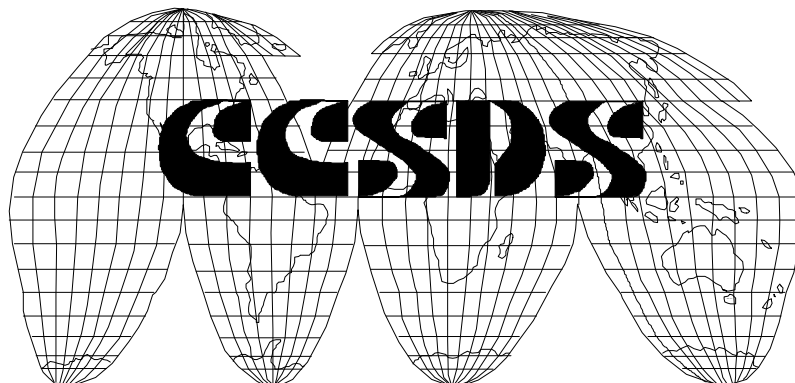
# ***Consultative Committee for Space Data Systems***

REPORT OF THE  
MANAGEMENT COUNCIL

## **CCSDS MANAGEMENT COUNCIL MEETING MINUTES**

CCSDS B10.0-Y-16  
YELLOW BOOK

May 1998



## DISTRIBUTION

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BNSC	Mr. Peter A. Vaughan
CNES	Mr. Roland Ivarnez
CSA	Arvind Bastikar
DLR	Mr. Hubertus Wanke
ESA	Mr. Erhard Jabs
INPE	Dr. Eduardo W. Bergamini
NASA HQ	Mr. David L. Townley
NASDA	Mr. Tsukasa Mito
RSA	Mr. Vladimir Starostin

### CCSDS Observer Agencies

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NSPO	Dr. Jun-ji Lee
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## **Panel/Subpanel Chairmen**

P1	Dr. K. Lenhart (ESA/ESOC)
P1A	Mr. M. MacMedan (NASA/JPL)
P1E	Mr. Jean Luc Gerner (ESTEC/ESA)
P1F	Mr. A. Hooke (NASA/JPL)
P1J	Mr. Felipe Flores-Amaya (NASA/GSFC)
P2	Dr. David Giaretta (BNSC/RAL)
	Mr. Nestor Peccia (ESA)
	Mr. D. Sawyer (NASA/GSFC)
P3	Mr. Maurice Winterholer (CNES)
	Ms. Patricia Lightfoot (NASA/GSFC)
	Mr. J. Kaufeler (ESA/ESOC)
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## **Information**

Mr. G. Delmas (ESA/ESOC)  
Mr. M. Drexler (DLR/GSOC)  
Ms. Michele LeSaux (SAC/CSIR)  
Ms. Linda Kezer (NASA/HQ)  
Mr. W. Poland, Jr. (NASA/GSFC)  
Mr. R. Stephens (SGT)  
Mr. N. Dissinger (AST)  
Mr. T. Gannett (J&T)

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## REPORT OF THE MANAGEMENT COUNCIL - MEETING MINUTES

SUBJECT: Minutes of the Consultative Committee for Space Data Systems (CCSDS) Management Council (MC) Meeting

PLACE: Tokyo, Japan

DATE: 8-9 June 1998

### I. ATTENDANCE

<u>Organization</u>	<u>Name</u>
BNSC/RAL	Peter Vaughan David Giaretta
CNES	Roland Ivarnez Maurice Winterholer
ESA	Erhard Jabs Carlo Mazza
ISAS	Takahiro Yamada
NASA	David Townley Adrian Hooke Thomas Gannett
NASDA	Masami Kashimoto Shingi Ogawa
NPSO	Jun-Ji Lee

### II. INTRODUCTION

The meeting was convened by Mr. David Townley, CCSDS Co-Chairman. The Delegates and other attendees introduced themselves.

### III. WELCOMING REMARKS

Mr. Tsukasa Mito welcomed all attendees and presented a video report on recent and planned NASDA activities. The video highlighted cooperative activities between NASDA and other CCSDS Agencies and demonstrated several of the ongoing efforts at NASDA related to participation in building and operating the International Space Station.

#### **IV. AGENDA REVIEW AND APPROVAL**

The agenda is shown in Attachment A. The MC approved the meeting agenda.

#### **V. REVIEW OF MINUTES FROM OXFORD**

The draft minutes from the fall 1997 meeting in Oxfordshire, England, were reviewed and accepted.

#### **VI. SECRETARIAT REPORT**

The Secretariat's report (Attachment B) was previously distributed to the members. This report included the CCSDS Documents Register and Directories of the CCSDS Member Agencies, Observer Agencies, and Associates.

#### **VII. REPORT ON SPACEOPS**

Mr. Hooke presented a report on the CCSDS session at SpaceOps 1998. In general the session was highly successful and there was considerable interest. The slides for the SpaceOps presentation are shown in Attachment C.

#### **VIII. REVIEW AND REPORT OF OPEN ACTION ITEMS**

The list of open action items is included as Attachment D.

96-10 OPEN. Mr. Bastikar was unable to attend the meeting. Because his earlier communications indicated the Canadian Standards Council could not provide the necessary information, it was agreed alternative routes would have to be explored. Mr. Giaretta agreed to take over the action from Mr. Bastikar.

96-14 OPEN. Mr. Townley reported that efforts to obtain the required information are ongoing. He will report at the November meeting.

97-10 CLOSED. Mr. Townley reported that ISS is using CCSDS AOS specifications extensively and enthusiastically (Attachment E). Details on ISS use of CCSDS are contained in the reports presented to the TSG in Houston. Mr. Townley provided copies of the reports at the meeting; they are included as Attachments F and G.

97-11 CLOSED. Discussion of item 97-11 was deferred to agenda item 14. A consolidation of review comments was presented. One change was made to the proposed wording (see XII) and the charter was then approved.

97-12 CLOSED. Discussion of item 97-12 was deferred to agenda item 11. Comments from Agency review will be reflected in an updated draft to be circulated for review (see action item 98-15).

97-13 CLOSED. Mr. Gannett presented the results of a NASA study on use of CCSDS recommended standards by current and planned space missions. This report is included as Attachment H.

97-14 OPEN. Discussion of item 97-14 was deferred to agenda item 9.

97-15 CLOSED. Mr. Townley reported that it was too late to be put on the agenda for the fall 1998 IAF meeting, but that inclusion on the 1999 (or later) agenda is being sought. Mr. Hooke reported on discussions with MacGregor Reid and stated that he will give a presentation at the IAA meeting at the end of September.

97-16 CLOSED. This item was merged with 98-15 and made a continuing action item on all members.

97-17 CLOSED. Mr. Townley reported that an article on P2 archiving was included in the May 1998 issue of the ISO bulletin. Copies of the issue were made available to those in attendance.

97-18 CLOSED. Discussion of item 97-18 was deferred to the Panel 2 report.

97-19 CLOSED. Discussion of item 97-19 was deferred to the Panel 2 report.

97-20 CLOSED. Discussion of item 97-20 was deferred to agenda item 14 (see XII). The Secretariat will update the Procedures Manual as necessary based on comments received.

97-21 CLOSED. Comments received by the TSG were reflected in the final TSG agenda.

## **IX. AGENCY REPORTS**

**BNSC.** Mr. Vaughan reported that BNSC supported Panels 1, 2, and 3, and that the level of overall support had remained stable for about two years. Some specific areas of BNSC participation included the ACE mission downlink, various workshops (details are reported on the Web), prototyping SLE services on STRV (information on results

should be available at the end of June), and the CEOS Catalogue Interoperability Protocol (CIP). Mr. Vaughan requested guidance on whether to bring the CIP directly to SC13 or to bring it in through normal P2 work (this question is discussed further under the panel 2 report, below). Mr. Hooke added that STRV 1a/b operations would be handed back to BNSC at another Ground Station. The BNSC report is included as Attachment I.

**CNES.** Mr. Ivarnez reported that CNES continued support to the Panels, and in particular was supporting work on CCSDS compatible missions and COP-1 for launch and early orbit. The overall level of support has decreased to four man years, but participation in Subpanel 1E has increased. ECSS participation has increased. The CNES report is included as Attachment J.

**DLR.** Mr. Wanke was unable to attend but provided the DLR report in advance to the Secretariat. Mr. Townley discussed highlights of report. The DLR report is included as Attachment K.

**ESA.** Mr. Jabs reported that ESA supported the MC, TSG, and all Panels, but that the primary focus of support is currently Panel 3. The overall level of ESA support remained unchanged. Some particular areas where support was provided include Subpanel 1A (Turbo Codes, revision of the Telecommand Green Book, and Lossy Data Compression), Subpanel 1E (Chair), Subpanel 1F (CCSDS Filed Delivery Protocol), Subpanel 1J (supporting at one delegate level), Panel 2 (slightly decreased level), Panel 3 (Red Book support). No new studies occurred, but ten existing studies continue. Implementation in LEOP stations is proceeding and should be completed in January. Integral SLE implementation is ongoing. Additionally, a new delegate has joined Subpanel 1A.

Mr. Mazza reported on the ESA position on SLE development. He had a successful meeting at NASA HQ with Mr. Spearing. Some confusion that arose after the meeting about the NASA position was later clarified to ESA's satisfaction by Mr. Spearing. At the end of July, ESA will receive offers from contractors. Mr. Townley added that he was pleased the effort was back on track.

No reduction to total effort is foreseen. In the future, because of budget reductions, ESA may have to reduce its contribution of permanent support but will consider increasing contract support. It is expected that resources for the 1999 mission will be strained, and Mr. Mazza asked all members to investigate measures to reduce resource expenditures on meetings/travel (especially for P3 support). He suggested maximizing use of electronic communications to reduce physical meetings. He also suggested that panel and TSG/MC/SC 13 meetings be held at the same time and the same place as a means to reduce travel. Mr. Winterholer expressed his support for the suggestion. Further discussion was deferred to Panel/TSG reports. The ESA report is included as Attachment L.

**NASA.** Mr. Hooke presented the NASA report. He reported on personnel changes in SOMO. He reported that NASA support for Panel 3 work was increased by 300% to about 18.5 man years; he indicated, however, that that support would not continue at the same level and expressed hope that P3 work would progress to Blue status by the next fiscal year. Although some realignment of resources is expected after the current fiscal year, NASA is expected to continue to support SuperMOCA as a pre-standardization R&D activity.

In the Panel 2 area, Mr. Hooke reported that NASA is participating in sponsoring a Digital Archive Directions workshop, and a current NASA study is assessing archives using a survey based on the CCSDS draft Archive Reference Model. The NASA report is included as Attachment M.

**NASDA.** Mr. Kashimoto presented the NASDA report. NASDA supported all three Technical Panels as well as the TSG and MC. Panel support activities included participation in review and analysis of CFDP, participation in Panel-2 Working Groups (WGs), and review of Panel-3 SLE draft Recommendations. A study on adoption of the Panel-3 SLE Services specifications for cross support is planned, and a study on revising the NASDA TT&C standard to include CCSDS RF&Mod is underway. The overall level of NASDA support to CCSDS remained constant. NASDA is widely implementing the CCSDS Recommendations, particularly Recommendations for Telecommand and AOS, in space vehicles and ground systems. The NASDA report is included as Attachment N.

**ISAS.** Mr. Yamada presented the ISAS report. ISAS supported Subpanels 1A and 1F and WG 1 of Panel 3. ISAS is implementing CCSDS Recommendations for telemetry and telecommand in several spacecraft and ground installations and intends to implement SLE services on MUSES-C; additionally, studies relating to CCSDS are ongoing. The ISAS report is included as Attachment O.

**NPSO.** Mr. Lee presented the NPSO report. NSPO is implementing CCSDS telemetry and telecommand Recommendations in ROCSAT-1. Use of CCSDS Lossless Data Compression is being studied for the ROCSAT-2 mission, which will be a remote-sensing satellite with an extremely high data rate. The NPSO report is included as Attachment P.

## **X. PANEL AND TSG REPORTS**

**Panel 1:** Mr. Jabs presented the Panel 1 report on behalf of Mr. Lenhart. Panel 1 recommended that the Time Code format change requested by Panel 2 be assigned to Panel 2, that Time Correlation Service be assigned to Panel 3, and that Standardization of On-Board Data System Interfaces be assigned to a new Panel. The first two of these

recommendations were approved (MC-S98-6 and MC-S98-5); the third was deemed an item for potential joint work between SC13 and SC14 (MC-S98-7). Panel 1 requested and received approval to issue draft documents for Agency review (MC-S98-4, MC-S98-2, and MC-S98-8), forward *Packet Telemetry Services* to SC13 (MC-S98-9), and withdraw two RF&Mod recommendations (MC-S98-3). Additionally, three Panel 1 documents were reconfirmed for one year (MC-S98-10, MC-S98-11, and MC-S98-19). The question of when the MC needs to approve a new work item came up as part of the Panel 1 issues. It was determined that the Procedures Manual is clear and should be followed, but also that it is imperative that the Panel reports indicate clearly whether any new work begins under the aegis of a Panel's existing work plan. The TSG chair was given an action item (98-6) to develop a Panel-report template that would clearly indicate all new work undertaken by a given Panel. The Panel 1 report is included as Attachment Q.

**Panel 2:** Mr. Giaretta presented the Panel 2 report. He discussed Panel 2 promotion as part of the work plan. Panel 2 requested and received approval to publish *CCSDS Panel 2 Methodology for Development of Recommendations* as a Yellow Book (MC-S98-12). Mr. Giaretta reported that work is continuing on updating *Standard Formatted Data Units — Structure and Construction Rules* (CCSDS 620.0-B-2) and *Parameter Value Language Specification* (CCSD0006) (CCSDS 641.0-B-1), and that another year would be required to complete work. The MC reconfirmed these two documents as well as *Standard Formatted Data Units — Control Authority Procedures* (CCSDS 630.0-B-1) for an additional year (MC-S98-13, MC-S98-14, and MC-S98-15). *ASCII Encoded English* (CCSD0002) (CCSDS 643.0-B-1) was reconfirmed for five years (MC-S98-16). Mr. Giaretta stated that CNES is preparing a new draft of *Data Entity Dictionary Specification Language (DEDSL)* (CCSD0011/CCSD0012) (CCSDS 647.0-R-1) for Red-2 review. The Panel 2 report is included as Attachment R.

The Catalog Interoperability Profile (CIP) is still under development and a new version is due to be released soon if not already released. CCSDS is waiting to receive the url so we can review it. Meanwhile, since the present CIP is oriented towards Earth Science and CCSDS is looking for more universality, CCSDS is considering dividing the CIP into two parts, the core part and a discipline-specific part.

CCSDS has a natural reluctance to take any standard which has been developed for a given requirement and proposing that standard as an international standard without studying it. It was also recognized that changes to the protocol itself would not be acceptable to the CIP developers. Therefore any changes would have to be editorial in nature.

**Panel 3:** Mr. Winterholer reported on Panel 3 activities: There were changes in leadership of Panel 3 WGs as well as the creation of two new WGs. Additional services were identified for development of Recommendations. Mr. Hooke suggested AOS All Frames and AOS Master Channel were potential SLE services, and NASDA accepted an

action item (98-9) to study whether current SLE specifications for Return All Frames and Return VC Frames could be modified to produce draft specifications for AOS SLE services. The Panel 3 report is included as Attachment S.

**TSG:** Mr. Jabs presented the TSG report on behalf of Mr. Lenhart. In reviewing the TSG action items, the issue of scheduling panel meetings was discussed at length. The TSG report is included as Attachment T.

## **XI. REPORT FROM LIAISONS**

The current list of liaisons is included as Attachment U.

TC20/SC14/WG3. Mr. Jabs reported that while there is some progress there is nothing significant to report beyond the fact that a report on Spacecraft Interoperability was approved as a Committee Draft.

COSPAR, INTELSAT, ISPRS, CEOS, WMO. Mr. Townley reported that there was nothing significant to report.

Because of the lack of significant reports concerning the liaisons, there was discussion about whether the current list of liaisons should be purged as well as whether the appropriate opportunities for liaisons have been identified. Mr. Hooke suggested that Jean LaTour/CNES might provide the liaison to SC14/WG3 in light of the fact that Mr. Jabs would be retiring. Mr. Hooke also suggested that the TSG assume responsibility for reviewing the liaisons activities. An action item was placed on the TSG (98-13).

## **XII. CHANGES TO PROCEDURES MANUAL**

Software Development Plan for NWIs. Mr. Townley proposed new language for the Procedures Manual relating to software development in association with NWIs (Attachment V). There was discussion on whether the new wording would require the Agencies to make a commitment to producing software. Mr. Hooke suggested a template for introducing NWIs would be helpful. The Secretariat accepted an action item (98-14) to develop a draft template for review by the MC members. The issue of wording for the Procedures Manual was deferred until the fall meeting.

TSG Charter. Mr. Townley provided a draft of proposed changes to the TSG Charter (Attachment W). After discussion, new wording was proposed for the purpose statement: "To report to the MC and act upon the instructions of the MC and guide and coordinate the overall activities of the technical panels." With that change, the new language for the TSG Charter was approved (MC-S98-20).

### **XIII. NEW BUSINESS**

Vision Statement. Mr. Hooke presented the current draft of *CCSDS: Vision, Mission, Approach* (Attachment X), which reflects review comments from DLR and ISAS. The draft was discussed at length and several modifications were recommended. Mr. Hooke will update the draft and circulate it for comment; an action item was assigned (98-15) to the Agencies to review the draft and provide comments.

Agency CCSDS Utilization Questionnaire. It was agreed that the Agencies would respond to the CCSDS Utilization Questionnaire (Attachment Y) prior to the fall MC meeting, and an action item was assigned (98-16).

Extended Liaison with SC 14. The matter of extended liaison with SC 14 was deferred for discussion during the SC 13 meeting.

Top Management Oriented Marketing Brochure. It was agreed that a Top Management Oriented Marketing Brochure would be helpful (see Attachment Z), but the resources to produce such a brochure could not be identified. An action item was assigned to all Member Agencies to consider development of a brochure (98-18). Mr. Giaretta accepted an action item to provide specifications to the Agencies for the scope and content of the brochure (98-17).

CCSDS-Related Implementations Green Book. NASA reported that an effort was ongoing within the U.S. to solicit inputs from U.S. companies for an update to the CCSDS-Related Implementations Green Book. Participants agreed that similar efforts by other Member Agencies should be conducted and information on new implementations reported to the Secretariat. An action item was placed upon the Member Agencies to investigate implementations within their respective countries and report their findings to the Secretariat (98-19). Mr. Townley accepted an action item (98-20) to provide the other Agencies with copies of the survey materials being used by NASA (Attachment AA).

Other New Business. Mr. Hooke reported on some ongoing work in the area of addressing. He described efforts underway to extend the current system of IP addressing to include non-terrestrial addresses. His report is included as Attachment BB.

### **XIV. PLANNING FOR NEXT TSG/MC MEETING**

Mr. Townley presented the proposed meeting schedule for discussion (Attachment CC). Mr. Hooke suggested that the Road Map WG meeting might be

moved back a day to allow participation in the ISO TC 20 plenary meeting in Vienna. With that change, the proposed schedule for the fall meetings was accepted.

It was decided that the fall 1999 meetings should be held in Europe. The Italian Space Agency (ASI) was identified as a good candidate to host the meetings. Mr. Mazza accepted an action item to contact ASI (98-21).

## **XV. APPROVAL OF RESOLUTIONS**

Mr. Gannett read the resolutions, which were approved. Draft copies of the Resolutions and Action Items will be distributed via e-mail.

## RESOLUTIONS

### CCSDS Management Council Meeting 8-9 June 1998 Tokyo, Japan

**MC-S98-1** The CCSDS resolves to encourage Member and Observer Agencies to do their best to provide information in their Agency reports relating to the status of CCSDS compliant implementations.

**MC-S98-2** The CCSDS resolves to approve release of the following draft recommendations for review by the CCSDS Agencies:

CCSDS 401.0 (2.2.7) R-1 (new)  
CCSDS 401.0 (2.4.12a) P-1.1 (revision)  
CCSDS 401.0 (2.4.12b) P-1.1 (revision)

The Secretariat will make arrangements for publication and distribution.

**MC-S98-3** The CCSDS resolves to approve the withdrawal of the following recommendations from the loose-leaf volume CCSDS 401.0-B, *Radio Frequency and Modulation Systems-Part 1: Earth Stations and Spacecraft*:

CCSDS 401.0 (3.1.3a) B-1  
CCSDS 401.0 (3.1.5b) B-1

**MC-S98-4** The CCSDS resolves to approve release of the draft updates to *Telemetry Channel Coding*, CCSDS 101.0-P-3.1, for Agency Review, provided that the Pink Sheets contain language warning the user that there is a patent on Turbo codes.

**MC-S98-5** The CCSDS resolves to assign the negative ASCII time code issue to Panel 2 for development. (The MC recognizes that this work item will be inactive until resources become available.)

**MC-S98-6** The CCSDS resolves to assign the Time Correlation NWI to Panel 3. (The MC recognizes that this work item will be inactive until resources become available.)

**MC-S98-7** The CCSDS resolves to present the issue of standardizing on-board data-system interfaces, networking, and time distribution to SC 13 for consideration of joint work between SC 13 and SC 14.

**MC-S98-8** The CCSDS resolves to approve release of *CCSDS File Delivery Protocol (CFDP)*, CCSDS 727.0-R-1, as a Red Book for Agency Review. The Secretariat will make

arrangements for publication and distribution. The CCSDS agrees that a draft Green Book will be made available at the CCSDS internal Web site to assist reviewers of the Red Book.

**MC-S98-9** The CCSDS resolves to forward *Packet Telemetry Services*, CCSDS 103.0-B-1, to SC 13 with the recommendation that it be progressed to an international standard.

**MC-S98-10** The CCSDS resolves to reconfirm CCSDS 202.0-B-2, *Telecommand Part 2 - Data Routing Service* (pending confirmation of concurrence from P1 and P1A).

**MC-S98-11** The CCSDS resolves to reconfirm CCSDS 202.1-B-1, *Telecommand Part 2.1 - Command Operation Procedures* (pending confirmation of concurrence from P1 and P1A).

**MC-S98-12** The CCSDS resolves to approve *CCSDS Panel 2 Methodology for Development of Recommendations* as a Yellow Book.

**MC-S98-13** The CCSDS resolves to reconfirm CCSDS 620.0-B-2, *Standard Formatted Data Units - Structure and Construction Rules*, for one year pending completion of Panel 2 review.

**MC-S98-14** The CCSDS resolves to reconfirm CCSDS 641.0-B-1, *Parameter Value Language Specification (CCSD0006)*, for one year pending completion of Panel 2 review.

**MC-S98-15** The CCSDS resolves to reconfirm CCSDS 630.0-B-1, *Standard Formatted Data Units - Control Authority Procedures*, for one year pending completion of P2 review.

**MC-S98-16** The CCSDS resolves to reconfirm CCSDS 643.0-B-1, *ASCII Encoded English (CCSD0002)*. The Secretariat will incorporate editorial corrections recommended by ISO review and republish.

**MC-S98-17** The CCSDS resolves to approve release of the SLE Services Document Return VC-Frames as a Red Book for Agency Review. The Secretariat will make arrangements for publication and distribution

**MC-S98-18** The CCSDS resolves to revise CCSDS 320.0-B-1 to incorporate the Corrigendum and remove the reference to a Blue Book on SCID Use.

**MC-S98-19** The CCSDS resolves to reconfirm CCSDS 701.0-B-2, *Advanced Orbiting Systems, Networks and Data Links: Architectural Specification*, for one year.

**MC-S98-20** The CCSDS resolves to accept the proposed revisions to the TSG Charter with the following additional change to the Purpose statement: "To report to the MC and act upon the instructions of the MC and guide and coordinate the overall activities of the CCSDS technical panels."

**MC-S98-21** CCSDS resolves to accept the proposal of the European Space Agency (ESA) to host the Fall 1998 MC Meeting at Darmstadt. The tentative dates are 5-6 November 1998. The Technical Steering Group (TSG) Meeting is scheduled for 4 November 1998.

**MC-S98-22** CCSDS resolves to accept the proposal of the National Aeronautics and Space Administration (NASA) to host the Spring 1999 panel, TSG, MC, and SC 13 meetings in conjunction in the vicinity of the Jet Propulsion Laboratory in Pasadena, California, USA. The tentative dates proposed are May 3-May 14 for panel meetings and May 17-19 for the TSG, MC, and SC 13 meetings.

**MC-S98-23** Because of anticipated budget constraints, the CCSDS resolves to defer making a decision on the location of the Fall 1999 meetings. The CCSDS expresses its sincere appreciation to INPE for its offer to host these meetings and will take that offer into consideration when making the final site selection.

**MC-S98-24** The CCSDS resolves to commend Mr. Takahiro Yamada, ISAS, for his outstanding contributions to the CCSDS by undertaking the technically challenging and administratively complicated task of reorganizing and resolving the diverse data structures, terms and processes across the entire set of CCSDS Space Link Communications Protocol Recommendations.

**MC-S98-25** CCSDS resolves to express its sincere appreciation to Mr. Erhard Jabs for his considerable contributions both as Principal Delegate for ESA and as participant in the technical panels prior to assuming that position.

**MC-S98-26** CCSDS thanks the National Space Development Agency of Japan (NASDA) for the excellent support and hospitality provided to the MC at the 8-9 June 1998 Meeting in Tokyo, Japan.

## **ACTION ITEMS**

### **CCSDS Management Council Meeting 8-9 June 1998 Tokyo, Japan**

98-1 The Secretariat will place electronic copies of the SpaceOps presentation on the Web for on-line viewing and downloading.

Assignee: CCSDS General Secretary  
Due Date: June 27

98-2 Agencies are asked to submit review comments on SLE Red Books.

(Note--Panel 3 hopes to have comments on Red Books before the October Meetings. Books will be released by end of July.)

Assignee: All Agencies  
Due Date: September 30

98-3 Mr. Winterholer will prepare a cover letter providing background material to facilitate review of the SLE Red Books by the Agency representatives.

Assignee: Maurice Winterholer  
Due Date: July 1

98-4 Agencies are asked to provide graphics of CCSDS compliant spacecraft to the Secretariat to enable the creation of a collage showing the full compliment of such spacecraft.

Assignee: All Agencies  
Due Date: July 15

98-5 Mr. Lee/NSPO will provide information on the use of CCSDS Recommendations on ROCSAT 1.

Assignee: Jun-Ji Lee  
Due Date: July 15

98-6 The TSG shall develop a template for the panel reports to the MC that differentiates between active and inactive items in the work program, shows changes since the last report, panel document status, the schedule for the work, and any issues impacting panel production.

Assignee: TSG Chair  
Due Date: Next MC Meeting

98-7 All Agencies should submit their requirements for SLE services.

Assignee: All Agencies  
Due Date: Next MC Meeting

98-8 All Agencies should submit documentation material relevant to actual cross support interface implementations.

Assignee: All Agencies  
Due Date: End of June

98-9 NASDA is requested to study whether they might be able to modify the current SLE specifications for

- Return All Frames (RAF)
- VC Frames

and from them to produce draft specifications for

- Return AOS All Frame (RAAF)
- AOS VC Frame (AVCF).

Assignee: NASDA  
Due Date: Next MC Meeting

98-10 The Secretariat shall provide NPSO with information concerning data rates for Lossless data compression.

Assignee: Secretariat  
Due Date: June 30

98-11 The Secretariat shall request that the Agencies provide input to roadmap WG.

Assignee: Secretariat  
Due Date: June 30

98-12 The Secretariat shall investigate the possibility of obtaining copies of ISO standards relating to PICs preparation.

Assignee: Secretariat  
Due Date: July 15, 1998

98-13 The TSG shall review the list of liaisons and determine the appropriate organizations and the appropriate persons to act as liaisons.

Assignee: TSG Chair  
Due Date: September 15, 1998

98-14 The Secretariat shall develop a template for submitting NWI requests. The template shall include questions regarding software development and industry participation. The Secretariat shall distribute the draft template to the MC members for review and comment.

Assignee: Secretariat  
Due Date: August 15, 1998

98-15 Member Agencies shall provide comments on the draft Vision-Mission Statement to be circulated for review by Mr. Hooke.

Assignee: All Agencies  
Due Date: September 1, 1998

98-16 The Agencies shall respond to the Agency CCSDS Utilization Questionnaire, which was provided as part of the Secretariat Mail-out Package.

Assignee: All Agencies  
Due Date: September 15, 1998

98-17 Mr. Giaretta will develop specifications for a Top Management Oriented Marketing Brochure.

Assignee: Mr. Giaretta  
Due Date: August 15, 1998

98-18 Member Agencies shall consider the proposal for a Top Management Oriented Marketing Brochure with regard to whether they have resources to devote to development of such a document.

Assignee: All Agencies  
Due Date: Next Meeting

98-19 The Agencies shall collect information on products developed within their respective countries and provide it to the Secretariat for inclusion in the CCSDS-Related Implementations Green Book

Assignee: All Agencies  
Due Date: September 30, 1998

98-20 The NASA Head of Delegation shall provide the Member Agencies with copies of the materials sent to U.S. companies requesting input for the CCSDS-Related Implementations Green Book.

Assignee: Dave Townley  
Due Date: June 30, 1998

98-21 ESA shall contact ASI about hosting the Fall 1999 meetings or identify an alternative candidate location.

Assignee: ESA  
Due Date: Next Meeting

98-22 All Agencies shall provide updated information on Agency Representatives for requesting SCIDs.

Assignee: All Agencies  
Due Date: September 30, 1998

**ATTACHMENT A**  
**AGENDA**

DRAFT AGENDA - CCSDS MANAGEMENT COUNCIL  
Tokyo, Japan June 08/09, 1998

1. Call to Order
2. Introduction of Delegates
3. Welcoming Remarks
4. Agenda Review and Approval
5. Review of Minutes from Oxford, England Meeting
6. Secretariat Report
- 6.1 Report on Results of SpaceOps Session
7. Review and Report of Open Action Items
8. Agency Reports
9. Reports from Technical Panels
  - Panel 1\*
  - Panel 2\*
  - Panel 3\*
  - TSG

\*Chairperson reports should include

  - (1) resource and schedule status,
  - (2) panel documents requiring MC approval, and
  - (3) an identification of which of that panel's Blue Books should be considered for submission as future ISO standards.
10. Report from Liaisons
  - Review Liaisons with Outside Organizations
11. Changes to Procedures Manual
  - S/W related changes
  - TSG Charter
12. New Business
  - Vision Statement
  - Agency CCSDS Utilization Questionnaire
  - Extended Liaison with SC-14
  - Top Management Oriented Marketing Brochure
13. Planning for next TSG/MC meeting
15. Approval of Resolutions/Action Items
16. Adjourn (not later than 12 noon 09 June)

**ATTACHMENT B**  
**SECRETARIAT'S REPORT**

**CCSDS SECRETARIAT PACKAGE**

**CCSDS MANAGEMENT COUNCIL MEETING  
Oxford, England  
13-14 November 1997**

- Directory of CCSDS Principal Delegates
- CCSDS Associates List
- CCSDS Document Register
- CCSDS Spacecraft ID Assignment Table

## **DIRECTORY OF CCSDS PRINCIPAL DELEGATES**

**May 1998**

### **Instructions regarding telephone and facsimile dialing**

The telephone and facsimile numbers listed in this directory are given in international format. The "+" sign at the start of each number refers to the whatever digits must be dialed in the country of origin in order to get an international access circuit. For calling within a country, this access code, the country code, and perhaps the city/area code should not be dialed.

**Please report any errors, omissions, or changes to this directory to the CCSDS Secretariat at the address/number below.**

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Report of the Management Council — Meeting Minutes, April 9-10, 1990	90-04	Yellow	B10.0-Y-1	
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Report of the Management Council — Meeting Minutes, November 1995	95-11	Yellow	B10.0-Y-11	
Report of the Management Council — Meeting Minutes, May 1996	96-05	Yellow	B10.0-Y-12	
Report of the Management Council - Meeting Minutes, November 1996	96-11	Yellow	B10.0-Y-13	
Report of the Management Council - Meeting Minutes, May 1997	97-05	Yellow	B10.0-Y-14	
Report of the Management Council — Meeting Minutes, November 1997	97-11	Yellow	B10.0-Y-15	

GSCID = Global Spacecraft Identification

NOTE – This list contains current issues as well as superseded issues of Blue Books. Superseded Red, Pink, Yellow, and Green books have been omitted for the sake of brevity. Titles of superseded issues appear in italics; titles of current issues appear in bold type. Minutes of past MC meetings are not considered to be superseded.

## CCSDS DOCUMENT REGISTER (BRIEF)

Revision Date: May 1998

Document Title	Date	Color	Number	Remarks
<i>PANEL 1 DOCUMENTS</i>				
<b>Telemetry Summary of Concept and Rationale</b>	<b>87-12</b>	<b>Green</b>	<b>100.0-G-1</b>	
<i>Telemetry Channel Coding</i>	<i>84-05</i>	<i>Blue</i>	<i>101.0-B-1</i>	
<i>Telemetry Channel Coding</i>	<i>87-01</i>	<i>Blue</i>	<i>101.0-B-2</i>	
<b>Telemetry Channel Coding</b>	<b>92-05</b>	<b>Blue</b>	<b>101.0-B-3</b>	<b>Due for reconfirmation or revision</b>
<i>Packet Telemetry</i>	<i>84-05</i>	<i>Blue</i>	<i>102.0-B-1</i>	
<i>Packet Telemetry</i>	<i>87-01</i>	<i>Blue</i>	<i>102.0-B-2</i>	
<i>Packet Telemetry</i>	<i>92-11</i>	<i>Blue</i>	<i>102.0-B-3</i>	
<b>Packet Telemetry</b>	<b>95-11</b>	<b>Blue</b>	<b>102.0-B-4</b>	
<b>Packet Telemetry Services</b>	<b>96-05</b>	<b>Blue</b>	<b>103.0-B-1</b>	
<b>Lossless Data Compression: Summary of Concept and Rationale</b>	<b>97-05</b>	<b>Green</b>	<b>120.0-G-1</b>	
<b>Lossless Data Compression</b>	<b>97-05</b>	<b>Blue</b>	<b>121.0-B-1</b>	
<b>Telecommand Summary of Concept and Rationale</b>	<b>87-01</b>	<b>Green</b>	<b>200.0-G-6</b>	
<i>Telecommand Part 1 — Channel Service</i>	<i>87-01</i>	<i>Blue</i>	<i>201.0-B-1</i>	
<b>Telecommand Part 1 — Channel Service</b>	<b>95-11</b>	<b>Blue</b>	<b>201.0-B-2</b>	
<i>Telecommand Part 2 — Data Routing Service</i>	<i>87-01</i>	<i>Blue</i>	<i>202.0-B-1</i>	
<b>Telecommand Part 2 — Data Routing Service</b>	<b>92-11</b>	<b>Blue</b>	<b>202.0-B-2</b>	<b>Due for reconfirmation or revision</b>
<b>Telecommand Part 2.1 — Command Operation Procedures</b>	<b>91-10</b>	<b>Blue</b>	<b>202.1-B-1</b>	<b>Due for reconfirmation or revision</b>
<b>Telecommand Part 3 — Data Management Service</b>	<b>87-01</b>	<b>Blue</b>	<b>203.0-B-1</b>	<b>Reconfirmed November 1995</b>
<i>Time Code Formats</i>	<i>87-05</i>	<i>Blue</i>	<i>301.0-B-1</i>	
<b>Time Code Formats</b>	<b>90-04</b>	<b>Blue</b>	<b>301.0-B-2</b>	<b>Reconfirmed November 1995</b>
<i>Radio Frequency and Modulation Systems—Part 1: Earth Stations and Spacecraft</i>	<i>87-01</i>	<i>Blue</i>	<i>401.0-B</i>	
<i>Radio Frequency and Modulation Systems—Part 1: Earth Stations and Spacecraft</i>	<i>89-09</i>	<i>Blue</i>	<i>401.0-B</i>	

Document Title	Date	Color	Number	Remarks
<i>PANEL 1 DOCUMENTS (CONTINUED)</i>				
<i>Radio Frequency and Modulation Systems—Part 1: Earth Stations and Spacecraft</i>	93-06	Blue	401.0-B	
<i>Radio Frequency and Modulation Systems—Part 1: Earth Stations and Spacecraft</i>	94-11	Blue	401.0-B	
<b>Radio Frequency and Modulation Systems— Part 1: Earth Stations and Spacecraft</b>	<b>97-05</b>	<b>Blue</b>	<b>401.0-B</b>	<b>Preparing for publication</b>
<b>Radio Frequency and Modulation—Part 1: Earth Stations</b>	<b>97-05</b>	<b>Green</b>	<b>411.0-G-3</b>	<b>Published electronically, hardcopy not yet available</b>
<b>Radio Frequency and Modulation Systems—Spacecraft-Earth Station Compatibility Test Procedures</b>	<b>92-05</b>	<b>Green</b>	<b>412.0-G-1</b>	
Report of the Proceedings of the RF and Modulation Subpanel Meeting at the Ames Research Center, April 11-20	89-09	Green	421.0-G-1	
Proceedings of the CCSDS RF and Modulation Subpanel 1E Meeting at the German Space Operations Centre September 20-24, 1993	93-10	Yellow	B20.0-Y-1	
<b>Advanced Orbiting Systems, Networks and Data Links: Summary of Concept, Rationale and Performance</b>	<b>92-11</b>	<b>Green</b>	<b>700.0-G-3</b>	
<i>Advanced Orbiting Systems, Networks and Data Links, Architectural Specification</i>	89-10	Blue	701.0-B-1	
<b>Advanced Orbiting Systems, Networks and Data Links: Architectural Specification</b>	<b>92-11</b>	<b>Blue</b>	<b>701.0-B-2</b>	<b>Due for reconfirmation or revision</b>
<b>Advanced Orbiting Systems, Networks and Data Links: Audio, Video and Still-Image Communications Services</b>	<b>94-05</b>	<b>Blue</b>	<b>704.0-B-1</b>	
<b>Advanced Orbiting Systems, Networks and Data Links: Audio, Video and Still-Image Communications Services</b>	<b>94-05</b>	<b>Green</b>	<b>704.1-G-3</b>	
<b>Advanced Orbiting Systems, Networks and Data Links: Formal Definition of CPN Protocols, Methodology and Approach</b>	<b>93-10</b>	<b>Green</b>	<b>705.0-G-2</b>	
<b>Advanced Orbiting Systems, Networks and Data Links: Abstract Data Type Library—Addendum to CCSDS 701.0-B-2</b>	<b>94-05</b>	<b>Blue</b>	<b>705.1-B-1</b>	
<b>Advanced Orbiting Systems, Networks and Data Links: Formal Specification of the Path Service and Protocol—Addendum to CCSDS 701.0-B-2</b>	<b>94-05</b>	<b>Blue</b>	<b>705.2-B-1</b>	

CCSDS DOCUMENT REGISTER (BRIEF)

Revision Date: May 1998

Document Title	Date	Color	Number	Remarks
<i>PANEL 1 DOCUMENTS (CONTINUED)</i>				
<b>Advanced Orbiting Systems, Networks and Data Links: Formal Specification of the VCLC Service and Protocol—Addendum to CCSDS 701.0-B-2</b>	<b>94-05</b>	<b>Blue</b>	<b>705.3-B-1</b>	
<b>Advanced Orbiting Systems, Networks and Data Links: Formal Specification of the VCA Service and Protocol—Addendum to CCSDS 701.0-B-2</b>	<b>94-05</b>	<b>Blue</b>	<b>705.4-B-1</b>	
Space Communications Protocol Specification (SCPS)— Rationale, Requirements, and Application Notes	97-06	Green	710.0-G-0.3	Draft Green Book
Space Communications Protocol Specification (SCPS)— Users Guide (SCPS-UG)	97-09	Green	711.0-G-0.2	Draft Green Book
Space Communications Protocol Specification (SCPS)— Network Protocol (SCPS-NP)	97-09	Red	713.0-R-3	
Space Communications Protocol Specification (SCPS)— Security Protocol (SCPS-SP)	97-09	Red	713.5-R-3	
Space Communications Protocol Specification (SCPS)— Transport Protocol (SCPS-TP)	97-09	Red	714.0-R-3	
Space Communications Protocol Specification (SCPS)— File Protocol (SCPS-FP)	97-09	Red	717.0-R-3	

## CCSDS DOCUMENT REGISTER (BRIEF)

Revision Date: May 1998

Document Title	Date	Color	Number	Remarks
<i>PANEL 2 DOCUMENTS</i>				
<b>Space Data Systems Operations with Standard Formatted Data Units: System and Implementation Aspects</b>	<b>87-02</b>	<b>Green</b>	<b>610.0-G-5</b>	
<i>Standard Formatted Data Units -- Structure and Construction Rules</i>	<i>88-02</i>	<i>Blue</i>	<i>620.0-B-1</i>	
<b>Standard Formatted Data Units — Structure and Construction Rules</b>	<b>92-05</b>	<b>Blue</b>	<b>620.0-B-2</b>	<b>Due for reconfirmation or revision</b>
<b>Standard Formatted Data Units — Structure and Construction Rules</b>	<b>96-11</b>	<b>Blue</b>	<b>620.0-B-2 Cor. 1</b>	<b>Corrigendum</b>
<b>Standard Formatted Data Units — A Tutorial</b>	<b>92-05</b>	<b>Green</b>	<b>621.0-G-1</b>	
Standard Formatted Data Units — Referencing Environment	95-11	Red	622.0-R-1	
<b>Standard Formatted Data Units — Control Authority Procedures</b>	<b>93-06</b>	<b>Blue</b>	<b>630.0-B-1</b>	<b>Due for reconfirmation or revision</b>
<b>Standard Formatted Data Units — Control Authority Procedures Tutorial</b>	<b>94-11</b>	<b>Green</b>	<b>631.0-G-2</b>	
<b>Standard Formatted Data Units — Control Authority Data Structures</b>	<b>94-11</b>	<b>Blue</b>	<b>632.0-B-1</b>	
<b>Parameter Value Language Specification (CCSD0006)</b>	<b>92-05</b>	<b>Blue</b>	<b>641.0-B-1</b>	<b>Due for reconfirmation or revision</b>
<b>Parameter Value Language — A Tutorial</b>	<b>92-05</b>	<b>Green</b>	<b>641.0-G-1</b>	
<b>Language Usage in Information Interchange Tutorial</b>	<b>89-10</b>	<b>Green</b>	<b>642.1-G-1</b>	
<b>ASCII Encoded English (CCSD0002)</b>	<b>92-11</b>	<b>Blue</b>	<b>643.0-B-1</b>	<b>Due for reconfirmation or revision</b>
<b>The Data Description Language EAST Specification (CCSD0010)</b>	<b>97-05</b>	<b>Blue</b>	<b>644.0-B-1</b>	
<b>The Data Description Language EAST — A Tutorial</b>	<b>97-05</b>	<b>Green</b>	<b>645.0-G-1</b>	
<b>The Data Description Language EAST — List of Conventions</b>	<b>97-05</b>	<b>Green</b>	<b>646.0-G-1</b>	
Data Entity Dictionary Specification Language (DEDSL) (CCSD0011/CCSD0012)	96-11	Red	647.0-R-1	

CCSDS DOCUMENT REGISTER (BRIEF)

Revision Date: May 1998

Document Title	Date	Color	Number	Remarks
<i>PANEL 3 DOCUMENTS</i>				
Introduction To CCSDS Cross Support	90-06	Green	910.0-G-1	
CCSDS Cross Support System Description Volume 1	90-06	Green	910.1-G-1	
Standard Terminology, Conventions, and Methodology (TCM) for Defining Data Services	94-11	Green	910.2-G-1	
Cross Support Concept — Part 1: Space Link Extension Services	95-05	Green	910.3-G-1	
Cross Support Reference Model Part 1: Space Link Extension Services	96-05	Blue	910.4-B-1	
Return All Frames Service Specification	97-11	Red	911.1-R-1	
Return Virtual Channel Frames Service Specification	97-11	Red	911.2-R-1	
Space Link Extension Forward CLTU Service	97-11	Red	912.1-R-1	
Space Link Extension Forward Space Packet Service Specification	97-11	Red	912.3-R-1	
<i>PANEL 4 DOCUMENTS</i>				
Radio Metric and Orbit Data	87-01	Blue	501.0-B-1	Reconfirmed May 1994

**ATTACHMENT C**

**CCSDS SPACEOPS'98 SESSION PRESENTATION**

# CCSDS Standardization

## SpaceOps 98

Tokyo, Japan  
04 June 1998  
*Special Remarks Session #2*  
*p0014*

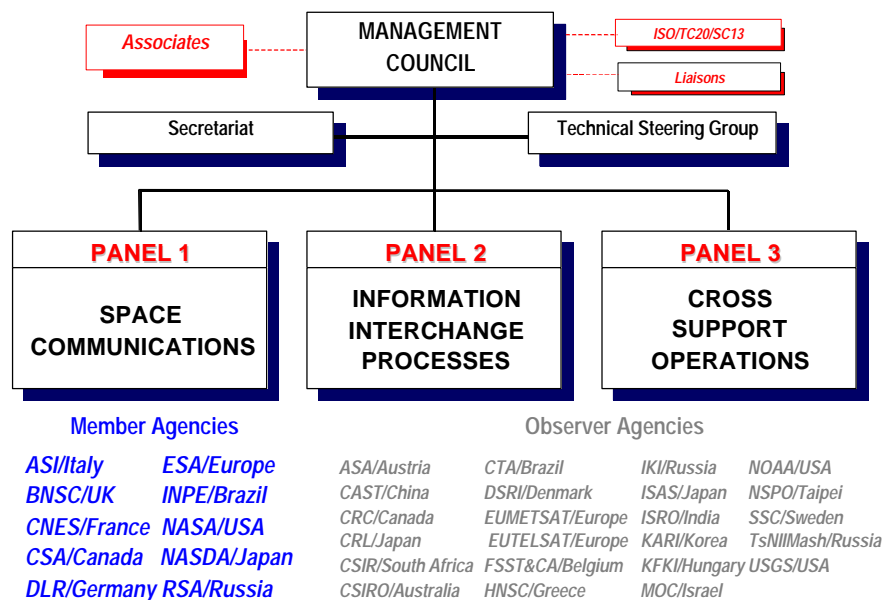
Adrian Hooke/NASA  
Maurice Winterholer/CNES  
David Giaretta/BNSC



## International Space Standards Process



## CCSDS ORGANIZATION

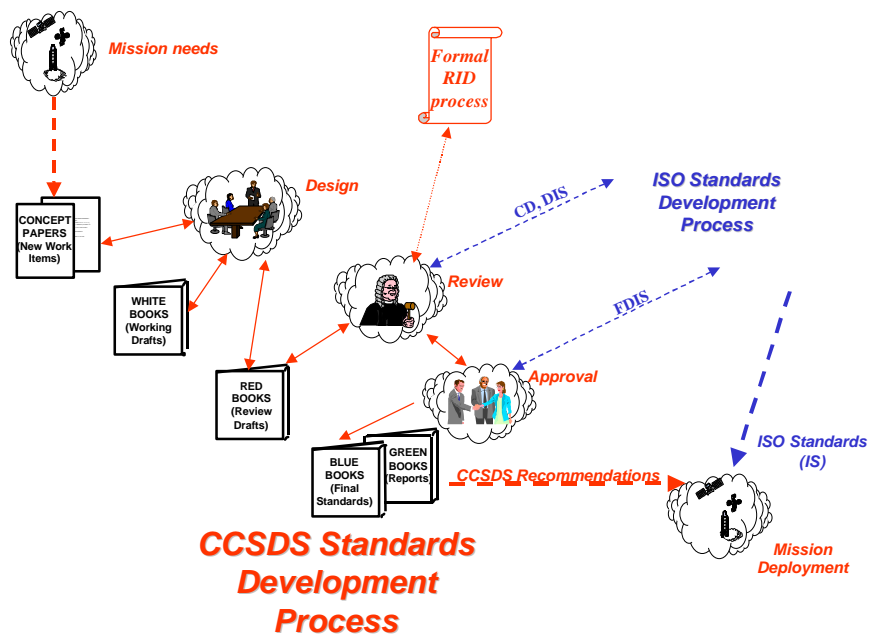


## CCSDS Associate Organizations

ADTECH, Inc. (NASA)	Earth Observation Sciences (BNSC)	Omitron, Inc. (NASA)
Aerospatiale Cannes Centre (CNES)	ESYS Limited (ESA)	Oxford University (BNSC)
Aerospatiale Space & Defense (CNES)	Fujitsu Limited (NASDA)	POD Associates, Inc. (NASA)
Aetheric Engineering Ltd. (BNSC)	GDP Space Systems (NASA)	Raumfahrt Systemingenieur (ESA)
Alcatel Bell Telephone (ESA)	Grupo Cejelsa (ESA)	RDR, Inc. (NASA)
Alcatel Espace (CNES)	Gulton Data Systems (NASA)	Saab Eriesson Space Ab (SSC/ESA)
Alenia Spazio (ESA)	HABCOM Engineering (NASA)	Satellites International Ltd. (ESA)
AP Labs (NASA)	Hitachi, Ltd. (NASDA)	Science Applications International Corporation (NASA)
Apogee Labs, Inc. (NASA)	Institut für Automation und Kommunikation (ESA)	Science Systems Limited (BNSC)
Avtec Systems, Inc. (NASA)	Institute for Information Management (ESA)	SED Systems Inc. (CSA)
Aydin Telemetry (NASA)	INTECS SISTEMI S.p.A. (ESA)	SEMA Group (CNES)
Berg Systems International, Inc. (NASA)	Interface and Control Systems, Inc. (NASA)	Serco Space Ltd. (BNSC)
Boeing Defense & Space Group (NASA)	Intermetrics Systems Services Corporation (NASA)	Sextant Avionique (CNES)
Brazilian Society for Interconnection of Open Systems (INPE)	Jackson and Tull Aerospace Engineering (NASA)	Sellumberger Industry (CNES)
Bristol Aerospace Limited (CSA)	JHU Applied Physics Laboratory (NASA)	Space Software Italia S.p.A. (ESA)
British Aerospace Space Systems Ltd. (BNSC)	LABEN S.p.A. (ESA)	Spacenet, Inc. (NASA)
California Space Technologies and Applied Research, Inc. (NASA)	LinCom Corporation (NASA)	Spar Aerospace Limited (CSA)
Canada Centre for Remote Sensing (CSA)	Lockheed Martin Telemetry and Instrumentation (NASA)	SRI International (NASA)
Canadian Astronautics Limited (CSA)	Logica UK Limited (BNSC)	STARSYS Global Positioning, Inc. (NASA)
CAP GEMINI S.p.A. (ESA)	LTCB Systems Co. Ltd. (NASDA)	Strachley Associates (NASA)
Cap Sesa Region Company (ESA)	MacDonald Dettwiler (CSA)	SYSECA SA Company (CNES)
Center for Satellite & Hybrid Communication Networks (NASA)	Matra Marconi Space (CNES)	Telemetry Group of Range Commanders Council (NASA)
Cincinnati Electronics Corporation (NASA)	Matra Marconi Space UK Ltd. (BNSC)	The Mitre Corporation (NASA)
CISST S.p.A. (ESA)	MBB - Deutsche Aerospace (ESA)	Thomson-CSF (CNES)
CISI Ingenierie (CNES)	Mitsubishi Electric Corporation (NASDA)	Toshiba Corporation (NASDA)
Cray Systems (BNSC)	MMS Space Systems Ltd. (BNSC)	TRW Inc. (NASA)
CSP Associates, Inc. (NASA)	MPB Technologies Inc. (CSA)	TSI TelSys, Inc. (NASA)
CTA Incorporated (NASA)	MPR TELTECH Ltd (CSA)	Universal Space Network, Inc. (NASA)
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DATAID EUROSOFT Society (CNES)	Nichols Research Corporation (NASA)	Vega Group PLC (BNSC)
Defence Research Agency (BNSC)	NYMA, Inc. (NASA)	
E-Systems, Inc. (NASA)		

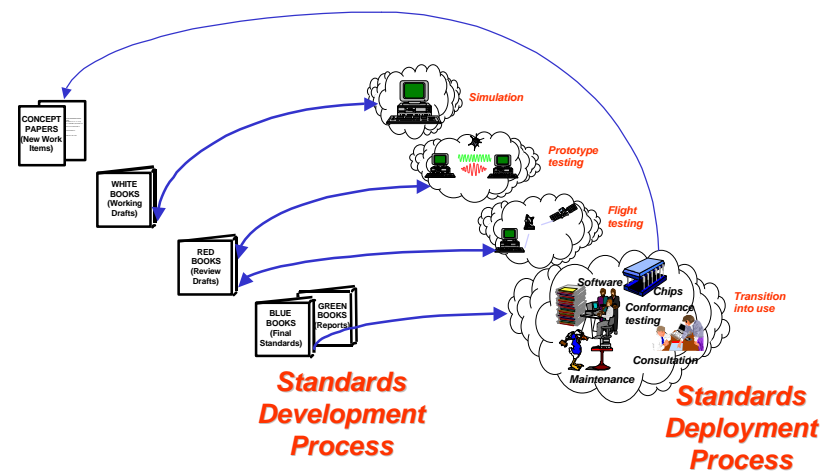
## CCSDS Liaison Organizations

AMERICAN INSTITUTE FOR AERONAUTICS AND ASTRONAUTICS	INTERNATIONAL SOCIETY FOR PHOTOGRAMMETRY AND REMOTE SENSING (ISPRS)	NORWEGIAN TECHNOLOGY STANDARDS INSTITUTION
CEOS	ISO/TC 46/SC 4 SECRETARIAT	WORLD METEOROLOGICAL ORGANIZATION
COSPAR	NATIONAL INFORMATION STANDARDS ORGANIZATION (NISO)	
ECMA		
INTELSAT		

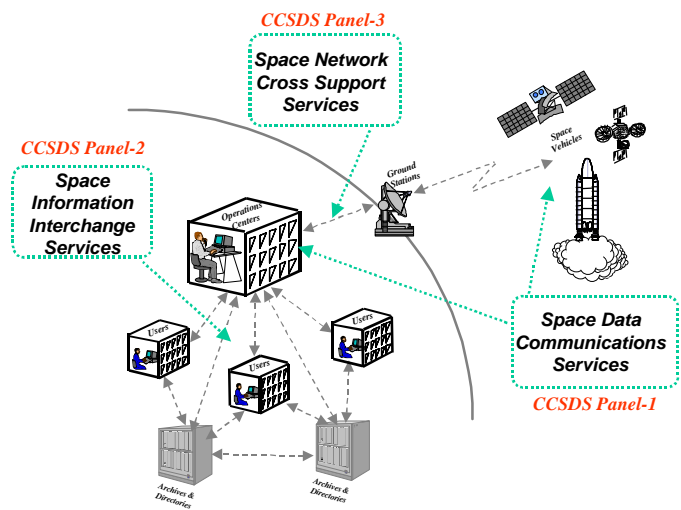


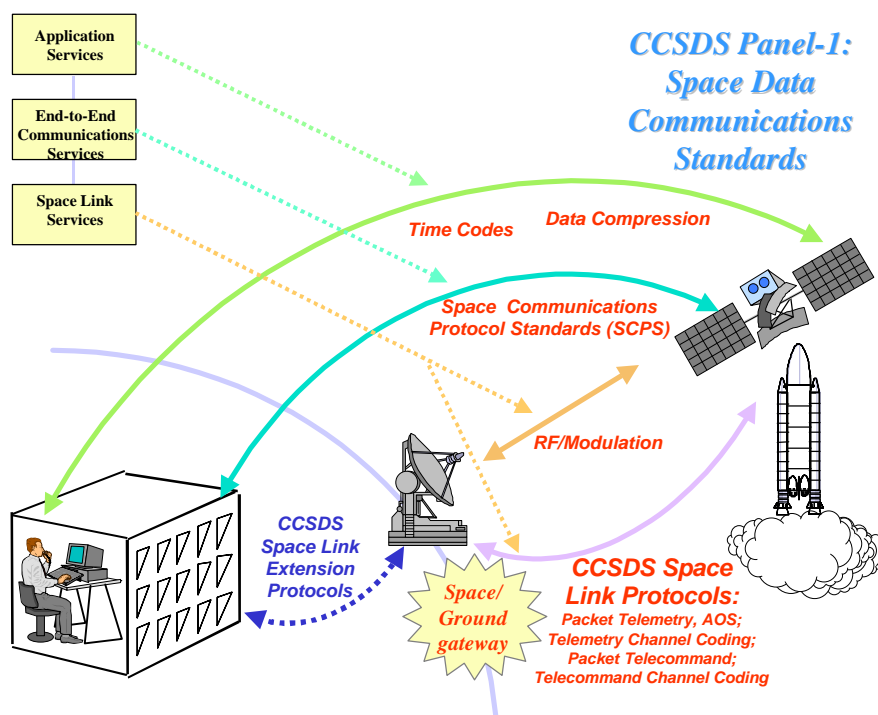
Current CCSDS => ISO Specification Flow

ISO:		CCSDS:	
ISO 11103	Radiometric & Orbit Data: 1991	501.0-B-1	87-01 Reconfirmed 1996
ISO 11104	Time Code Formats: 1991	301.0-B-2	90-04 Reconfirmed 1996
FDIS 12172	Telecommand Part 2-Data Routing Services	202.1-B-2	92-11 Approved, in Publication
ISO 11754	Telemetry Channel Coding: 1994	101.0-B-3	92-05 Published
ISO 12175	SFDU-Structure & Construction Rules: 1994	620.0-B-2	92-05 Published
ISO 13419	Packet Telemetry: 1997	102.0-B-3	92-11 Published
ISO 13420	AOS, N&DL: Architectural Specification:1997	701.0-B-2	92-11 Published
ISO 13764	SFDU-Control Authority Procedures: 1996	630.0-B-1	93-06 Published
ISO 14961	PVL Specification (CCSD 0006)	641.0-B-1	92-05 Published
ISO 14962	ASCII Encoded English (CCSD 0002)	643.0-B-1	92-11 Published
ISO 15395	SFDU-Control Authority Data Structures	632.0-B-1	94-11 Published
ISO 15396	Cross Support Reference Model-SLE Services	910.4-B-1	96-05 Published
FDIS 12171	Telecommand Part 1-Channel Services	201.0-B-1	87-01 FDIS registered for formal approval.
FDIS 12173	Telecommand Part 2-1-Command Op. Proc.	202.1-B-1	91-10 FDIS ballot initiated.
FDIS 12174	Telecommand Part 3-Data Mgmt. Procedures	203.0-B-1	87-01 FDIS ballot initiated.
CD 14721	Space Systems - Archiving Space Data	-	- CD study initiated.
DIS 15887	Lossless data compression	121.0-B-1	97-05 DIS distributed for review; French text required.
DIS 15888	Standard formatted data units - Referencing environment	622.0-B-1	97-05 DIS distributed for review; French text required.
DIS 15889	Data description language - EAST specification	644.0-b-1	97-05 DIS distributed for review; French text required.
DIS 15890	AOS Audio/Video and Still-Image Communications Services	704.0-B-1	94-05 DIS distributed for review, French text required.
DIS 15891	Space communications protocol specification (SCPS)- Network protocol (SCPS-NP)	713.0-R-3	97-09 Registered as DIS 1997-11
DIS 15892	Space communications protocol specification (SCPS) - Security protocol (SCPS-SP)	713.5-R-3	97-09 Registered as DIS 1997-11
DIS 15893	Space communications protocol specification (SCPS) - Transport protocol (SCPS-TP)	713.4-R-3	97-09 Registered as DIS 1997-11
DIS 15894	Space communications protocol specification (SCPS) - File protocol (SCPS-FP)	717.0-R-3	97-09 Registered as DIS 1997-11



## Principal Domains of Space Mission Operations Standardization







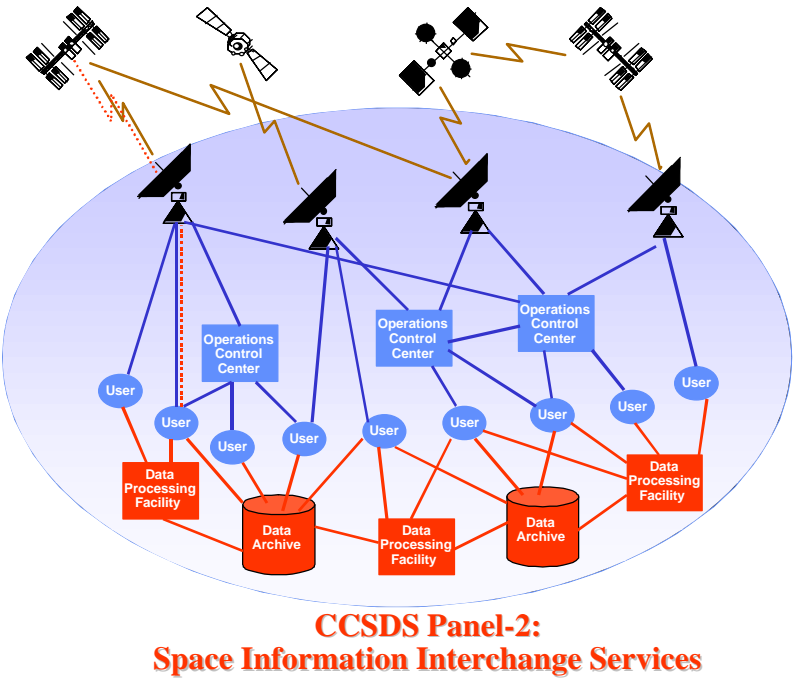
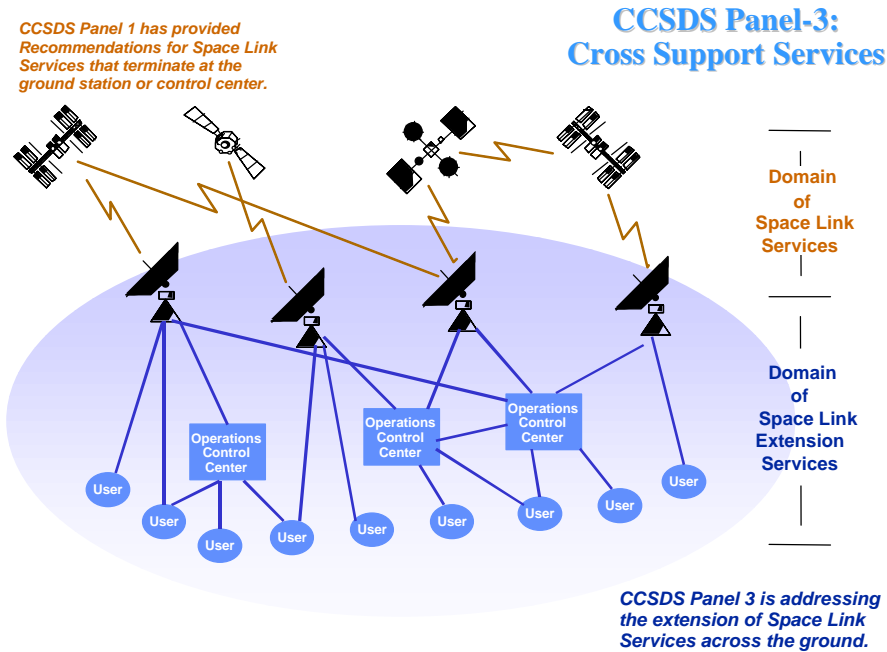
### Missions/Projects Using CCSDS Link/Network-Layer Protocols for Telemetry and Telecommand

<b>ERS-1</b> (ESA, Jul-91)	<b>MGS</b> (NASA/JPL, Nov-96)	<b>DS-1 (NMP)</b> (NASA/JPL, Jul-98)	<b>ENVISAT-1</b> (ESA, Jul-99)	<b>International Space Station (ISS)</b> (Multinational, Various)
<b>SAMPX (SMEX-1)</b> (NASA/GSFC, Jul-92)	<b>MPF</b> (NASA/JPL, Dec-96)	<b>Landsat-7</b> (NASA/GSFC, Jul-98)	<b>ADEOS-2</b> (NASDA, Aug-99)	<b>ISS-Columbus</b> (ESA, TBD)
<b>EURECA</b> (ESA, Jul-92)	<b>ARIANE 5</b> (CNES, Various)	<b>Meteor-3M/ SAGE III</b> (RSA/NASA, Aug-98)	<b>XMM</b> (ESA, Aug-99)	<b>ISS-JEM</b> (NASDA, TBD)
<b>Spacelab-Deutsche 2</b> (DLR, Apr-93)	<b>ACE</b> (NASA/GSFC, Aug-97)	<b>OERSTED</b> (DSRL, Aug-98)	<b>Genesis (Discovery 5)</b> (NASA, Aug-99)	<b>ISS-AMS</b> (Multinational, TBD)
<b>STRV-1 A/B</b> (DERA, Jan-94)	<b>Hotbird-3</b> (EUTELSAT, Sep-97)	<b>WIRE (SMEX-5)</b> (NASA/GSFC, Sep-98)	<b>ARTEMIS</b> (ESA, Dec-99)	<b>EOS LAM-1</b> (NASA/GSFC, Jul-01)
<b>MIR 18 and follow-on missions</b> (RSA/NASA, Feb-95—)	<b>Cassini</b> (NASA/JPL, Oct-97)	<b>FUSE</b> (NASA/GSFC, Oct-98)	<b>IMAGE (MIDEX-01)</b> (NASA/GSFC, Jan-00)	<b>SIRTF</b> (NASA/JPL, Dec-01)
<b>ERS-2</b> (ESA, Apr-95)	<b>TEAMSAT</b> (ESA, Oct-97)	<b>QuikSCAT</b> (NASA/JPL, Nov-98)	<b>VCL (ESSP-01)</b> (NASA/GSFC, Mar-00)	<b>ETS-VIII</b> (NASDA, Aug-02)
<b>ISO</b> (ESA, Nov-95)	<b>YES</b> (ESA, Oct-97)	<b>Mars 98 Orbiter</b> (NASA/JPL, Dec-98)	<b>JASON</b> (CNES, Apr-00)	<b>EOS CHEM-1</b> (NASA/GSFC, Dec-02)
<b>Radarsat</b> (CSA, Nov-95)	<b>ETS-VII</b> (NASDA, Nov-97)	<b>SWAS (SMEX-3)</b> (NASA/GSFC, Jan-99)	<b>TIMED</b> (APL, Apr-00)	<b>ROSETTA</b> (ESA, 2003)
<b>SOHO</b> (ESA, Dec-95)	<b>TRMM</b> (NASDA, Nov-97)	<b>Hotbird 4</b> (EUTELSAT, Jan-99)	<b>STENTOR</b> (CNES, Jun-00)	<b>METOP 1</b> (ESA/ELMET SAT, 2003)
<b>Rosetta XTE</b> (NASA/GSFC, Dec-95)	<b>EUTELSAT-F1</b> (EUTELSAT, Jan-98)	<b>Mars 98 Lander</b> (NASA/JPL, Jan-99)	<b>HESSI (SMEX 6)</b> (NASA/GSFC, Jun-00)	<b>X-38</b> (NASA, Mar-03)
<b>NEAR</b> (APL, Feb-96)	<b>Lunar Prospector</b> (NASA/ARC, Jan-98)	<b>ABRIXAS</b> (DLR/GSFC, Feb-99)	<b>Cluster II</b> (ESA, Jan-00)	<b>NOAA N and follow-on missions</b> (NOAA, Dec-03—)
<b>BeppoSAX</b> (ASI, Apr-96)	<b>SNOE</b> (U of Cal, LASP, Jan-98)	<b>Stardust</b> (NASA/JPL, Feb-99)	<b>MAP (MIDEX-02)</b> (NASA/GSFC, Nov-00)	<b>EOS AM-2</b> (NASA/GSFC, Jan-04)
<b>Cluster</b> (ESA, Jan-96)	<b>TRACE (SMEX-4)</b> (NASA/GSFC, Mar-98)	<b>AXAF-1</b> (NASA/MSFC, May-99)	<b>EOS PM-1</b> (NASA/GSFC, Dec-00)	<b>GLAST</b> (NASA/GSFC, Jan-04)
<b>TOMS EP-1</b> (NASA/GSFC, Jul-96)	<b>EOS AM-1</b> (NASA/GSFC, Jan-98)	<b>EO-1 (NMP-2)</b> (NASA/GSFC, May-99)	<b>GALEX (SMEX 7)</b> (NASA/GSFC, 2001)	<b>EOS PM-2</b> (NASA/GSFC, Dec-06)
<b>FAST (SMEX-2)</b> (NASA/GSFC, Aug-96)	<b>STRV-1 C/D</b> (DERA, Jan-98)	<b>CHAMP</b> (DLR, Jan-99)	<b>ALOS</b> (NASDA, Feb-01)	<b>EOS AM-3</b> (NASA/GSFC, Jan-10)
	<b>CATSAT (STEDI 3)</b> (U of NH, Jul-98)		<b>INTEGRAL</b> (ESA, Jun-01)	<b>EOS PM-3</b> (NASA/GSFC, Dec-12)



### Missions Using CCSDS Lossless Data Compression (Recommendation 121.0-B-1, May 1997)

<u>Mission</u>	<u>Launch</u>	<u>Lead Agency</u>	<u>Implementation</u>
Mars Observer	Sep-92 <sup>†</sup>	NASA/JPL	HW
SERTS-96 (Sounding Rocket)	Nov-96	NASA/GSFC	HW
Mars 96	Nov-96 <sup>†</sup>	RSA	?
Lewis (SSTI)	Aug-97 <sup>†</sup>	NASA	HW
Cassini/Huygens Cosmic Dust Analyzer (CDA ) Instrument	Oct-97	NASA/JPL	SW (uploaded after launch)
SERTS-97 (Sounding Rocket)	Nov-97	NASA/GSFC	HW
SWAS (SMEX-3)	Jan-99	NASA/GSFC	SW
EO-1 (NMP-2)	May-99	NASA/GSFC	?
KOMPSAT-1	1999	KARI	HW
VCL (ESSP-01)	Mar-00	NASA/GSFC	HW
MAP (MIDEX-02)	Nov-00	NASA/GSFC	SW
EOS LAM-1	Jul-01	NASA/GSFC	?
SIRTF	Dec-01	NASA/JPL	?
ROSETTA	Jan-03	ESA	HW
COBRA	1997	U.S. Dept. of Energy	HW
Space-Based Infrared System (SBIRS)	?	U.S. Dept. of Defense	HW
Standard Missiles	Various	U.S. Dept. of Defense	HW





### Planned Use of CCSDS Space Link Extension Services

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<u>Mission</u>	<u>Launch</u>	<u>Lead Agency</u>
<b>ABRIXAS</b>	Feb-99	DLR
<b>CHAMP</b>	Jun-99	DLR
<b>Cluster II</b>	Jun-00	ESA
<b>INTEGRAL</b>	Jun-01	ESA
<b>ROSETTA</b>	2003	ESA

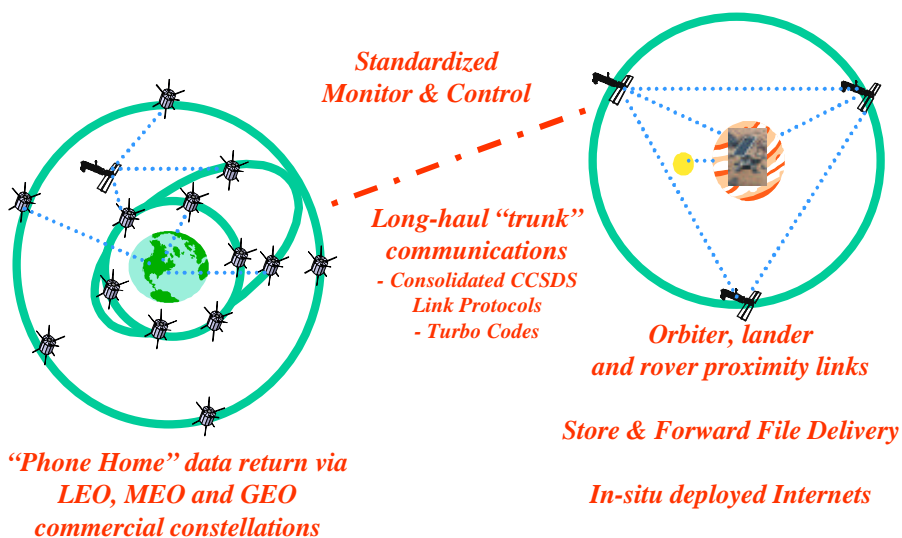


### CCSDS Standard Formatted Data Units (SFDUs): Use for Mission Data Archiving

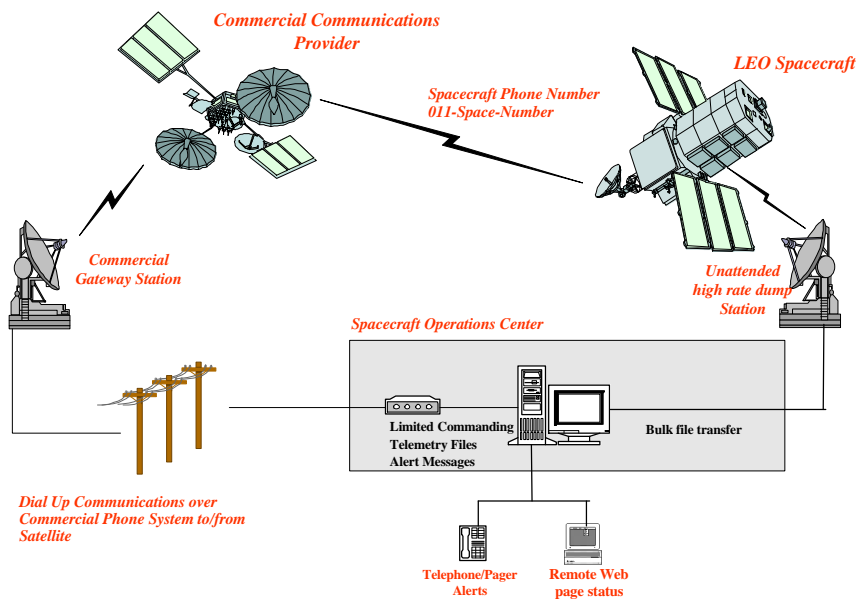
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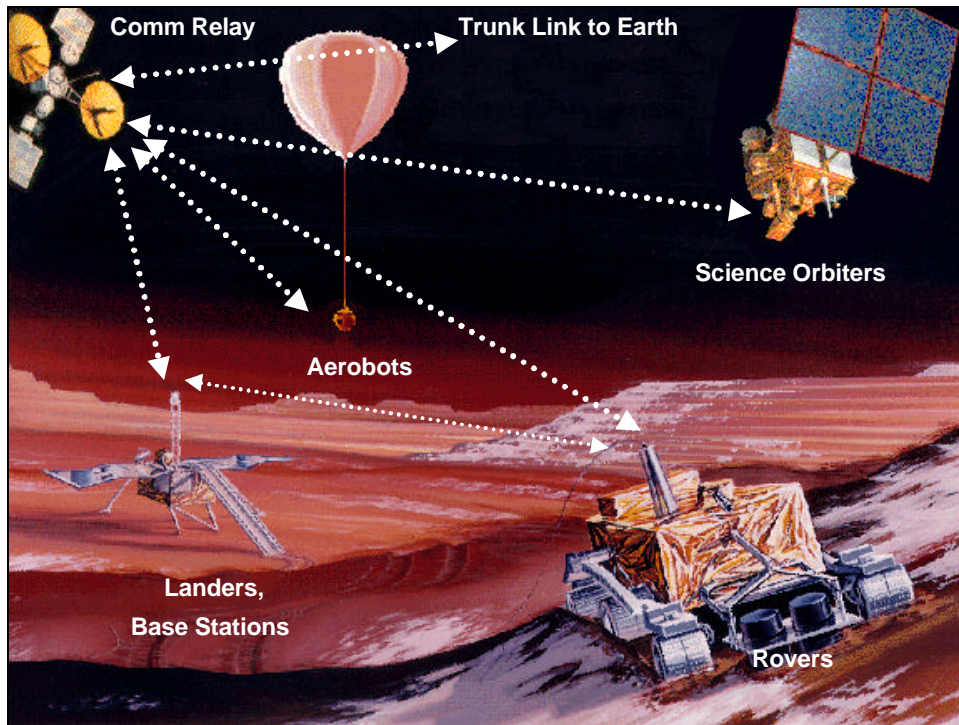
<b>ACE</b>	<b>Galileo</b>	<b>Mars Global Surveyor</b>
<b>AXAF-I</b>	<b>GOES (multiple)</b>	
<b>Cassini/Huygens</b>	<b>Geotail</b>	<b>Mars Pathfinder</b>
<b>Clementine</b>	<b>IMAGE (MIDEX-01)</b>	<b>Mars Surveyor-Lander 98</b>
<b>Cluster II</b>	<b>IMP 8</b>	<b>Mars Surveyor-Orbiter 98</b>
<b>ENVISAT-1</b>	<b>Interball</b>	<b>PHOBOS 2</b>
<b>EO-1 (NMP-2)</b>	<b>IRAS</b>	<b>Polar</b>
<b>ERS-1</b>	<b>ISIS</b>	<b>Rossi XTE</b>
<b>ERS-2</b>	<b>Magellan</b>	<b>SAMPEX</b>
<b>FAST</b>	<b>Mariner</b>	<b>SOHO</b>
<b>FUSE</b>	<b>MAP (MIDEX-02)</b>	

## Future Directions In Standardization



## Alternative Communications: "Phone Home Link" Concept

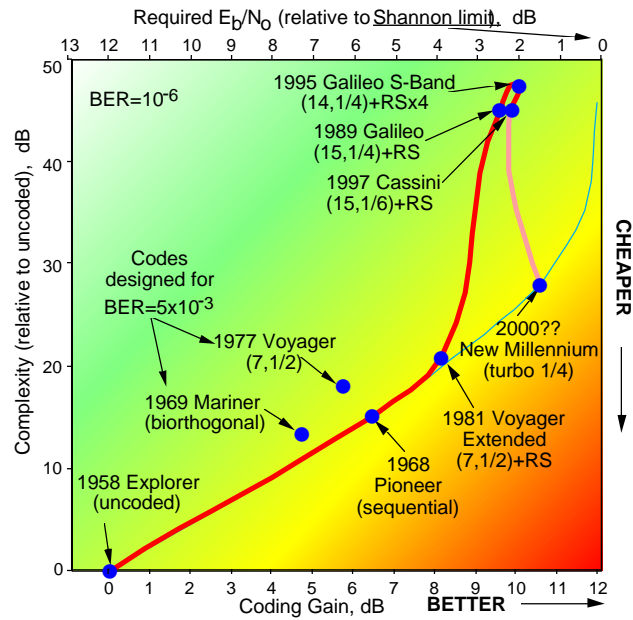




20

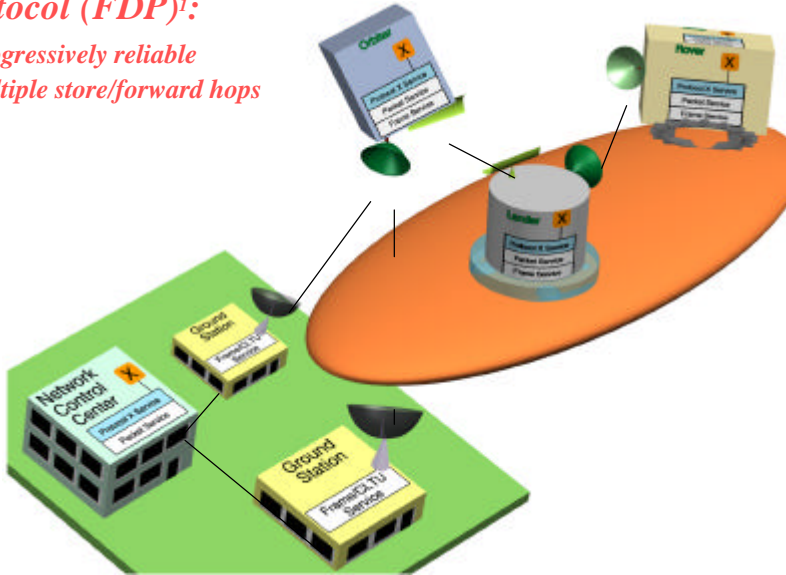
## Turbo Codes

*Turbo codes represent a quantum leap in channel coding performance for deep space applications, providing higher coding gain and much lower decoding complexity than current coding systems*



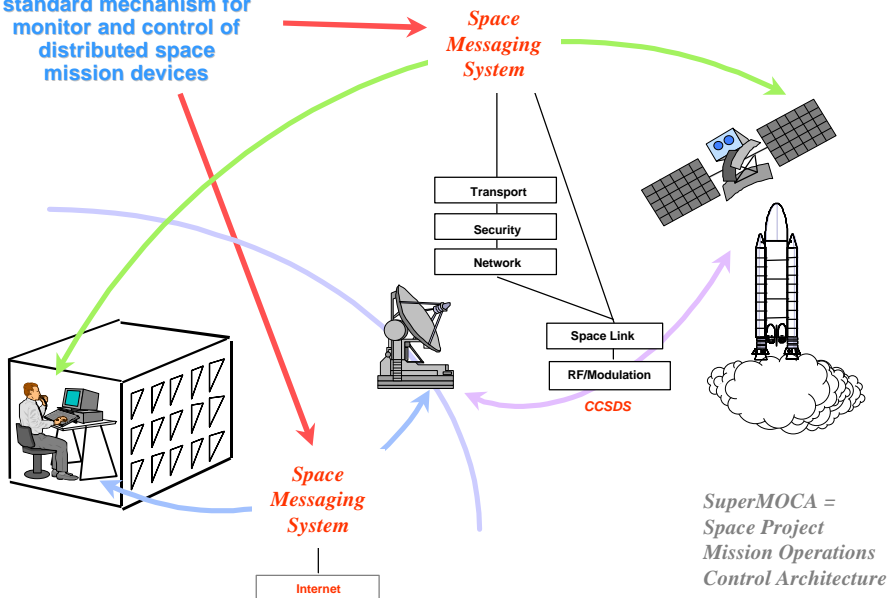
## CCSDS File Delivery Protocol (FDP)<sup>1</sup>:

- Progressively reliable
- Multiple store/forward hops



<sup>1</sup> formerly known as Protocol-X

## SuperMOCA: standard mechanism for monitor and control of distributed space mission devices



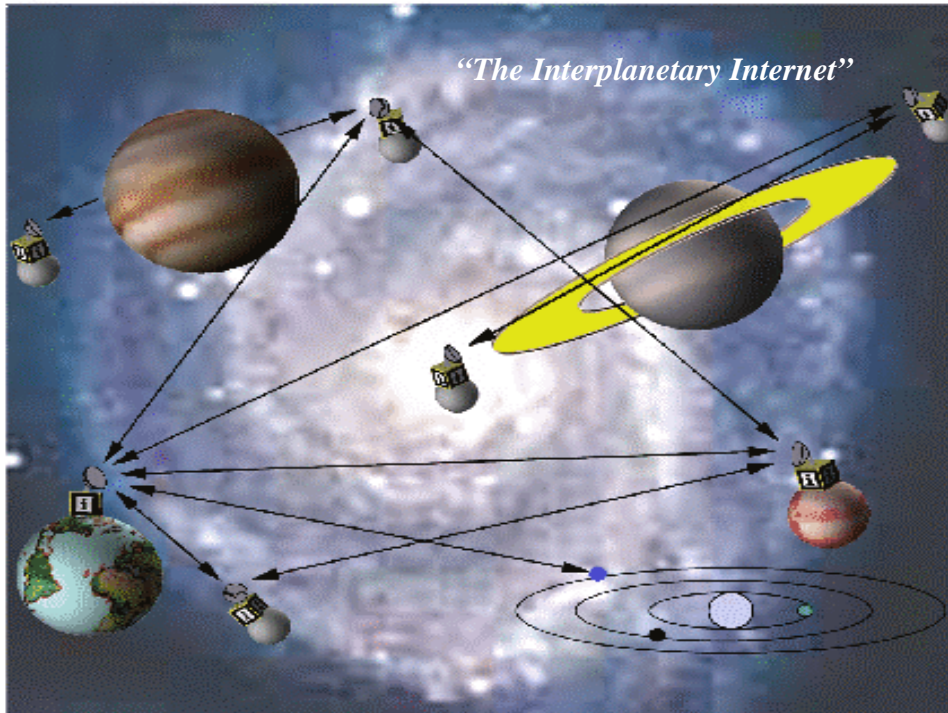
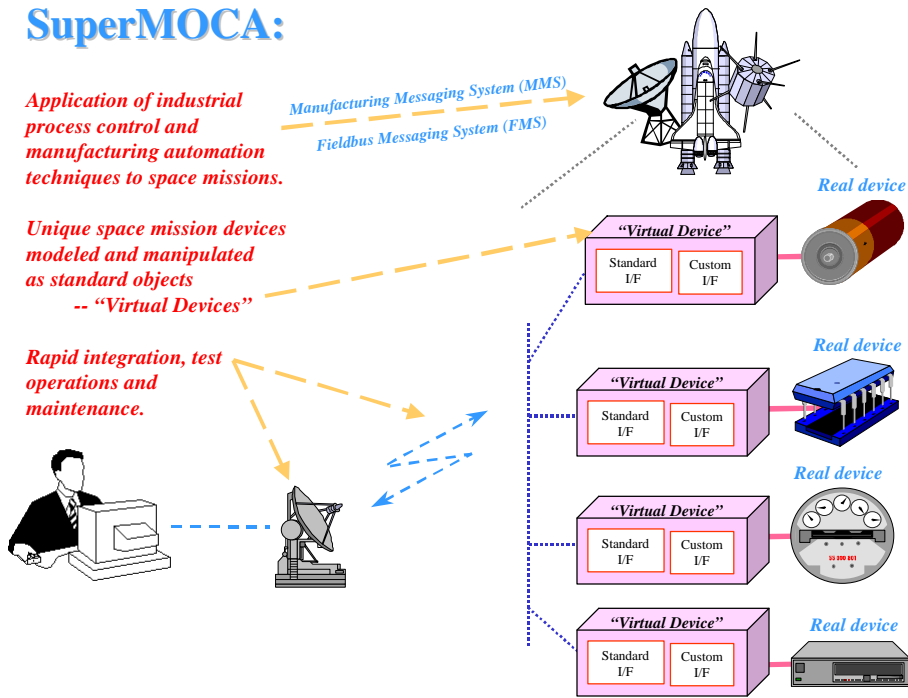
## SuperMOCA:

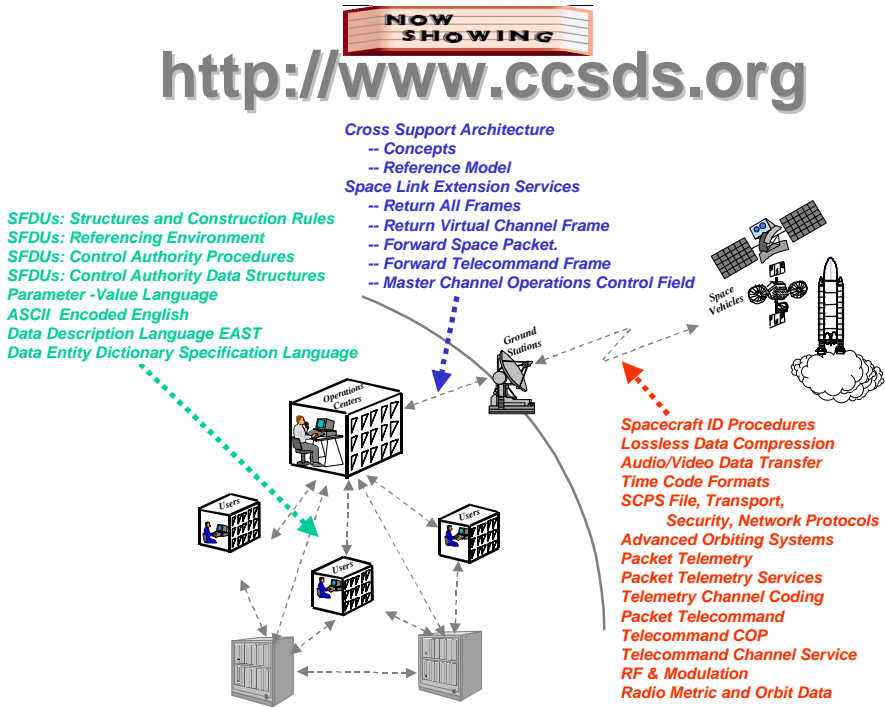
23

*Application of industrial process control and manufacturing automation techniques to space missions.*

*Unique space mission devices modeled and manipulated as standard objects -- "Virtual Devices"*

*Rapid integration, test operations and maintenance.*





**ATTACHMENT D**  
**OPEN ACTION ITEMS**

**ACTION ITEMS**  
**CCSDS MANAGEMENT COUNCIL**  
**Nov. 1997**                      **Oxfordshire, UK**

- 96-10. Identification of personnel of archiving working group of TC 211 for P2 and the Secretariat. Provide a copy of TC 211 proposed draft.**

**Assignee: CSA/A. Bastikar**  
**Due Date: January 1998**  
**Status: No Change - Remains Open**

- 96-14. Contact NASA ELV and RLV Program Offices to determine the extent that they plan to use CCSDS. If they do not plan to use CCSDS, understand why not.**

**Assignee: NASA/D. Townley**  
**Due Date: May 1998**  
**Status: No Change - Remains Open**

- 97-10. Mr. Townley will explore with the NASA Space Station Office the extent to which the ISS will use CCSDS standards. In addition, an invitation will be issued to the ISS Program Office to provide a briefing during the panel meetings at Houston, Texas, during the Spring of 1998.**

**Assignee: NASA/D. Townley**  
**Due Date: May 1998**  
**Status: Closed-Presentation made by ISS Office at JSC during May TSG**

- 97-11. All Member Agencies should review the latest draft of the TSG Charter and submit comments to the Secretariat.**

**Assignee: All Member Agencies**  
**Due Date: December 15, 1997**  
**Status: Several Agencies Provided Responses -  
Defer to later in Agenda**

- 97-12. All Member Agencies should review and provide inputs to the draft vision statement. Each Member Agency delegate should also state why their agency participates, how they contribute to the activities of CCSDS, and describe the environments in which the agencies anticipate their mission development to occur. Example: The NASA faster, better, cheaper mission set; i.e., more missions in a shorter period of time.**

**Assignee: All Member Agencies**  
**Due Date: December 15, 1997**  
**Status: Several Agencies Provided Responses -  
Defer to later in Agenda**

- 97-13. NASA should provide list of missions utilizing CCSDS to MC and panel chairs.**

**Assignee: NASA/Mr. Hooke**  
**Due Date: February 1998**  
**Status: Closed-NASA has compiled this list -  
Defer to later in the Agenda**

- 97-14. In response to P3's need for the definition and control of unique naming conventions within CCSDS for spacecraft, agency and complex names, Panels are to provide a requirements statement to the TSG. The TSG will review and provide a recommendation to the MC.**

**Assignee: Panel and Subpanel Chairmen**  
**Due Date: 15 February 1998**  
**Status: Interpanel Working Group formed to study problem; identify relevant ISO Standards -  
Defer to Panel Reports later in the Agenda**

- 97-15. INPE/Mr. Bergamini and CSA/Mr. Bastikar are to approach the IAF about a CCSDS session in the fall of 1998.**

**Assignee: CSA/Mr. Bastikar, INPE/Mr. Bergamini**  
**Due Date: ASAP**  
**Status: Closed:**

**Extensive communications held with  
IAAA/IAF  
Determined too late to be included in 1998  
activity  
Alternate mechanisms are being  
investigated by Macgregor Reid**

- 97-16. All Member Agencies should look at other targets of opportunity to present CCSDS and provide this list to the Secretariat by December 1. Each Agency delegate should follow up on opportunities identified and explore with the appropriate group the possibility of CCSDS getting involved.**

**Assignee: Member Agencies**

**Due Date: (a) List of opportunities-December 1, 1997  
(b) Contact appropriate organization-Jan. 15, 1998**

**Status: Several Agencies have responded**

- 97-17. The Secretariat will contact ISO Central Secretariat about an article in the ISO newsletter.**

**Assignee: Secretariat/Mr. Townley**

**Due Date: ASAP**

**Status: Closed:**

**Article on P2's Data Archiving Standards  
was included in the May 1998 issue of ISO  
Bulletin-Copy Available**

- 97-18. With regard to the proposed CEOS Catalogue Interoperability Protocol (CIP), Mr. Giaretta will draft a cover sheet and send to TSG for review and recommendation at the next MC meeting.**

**Assignee: RAL/D. Giaretta**

**Due Date: April 1998**

**Status: Open**

**97-19. With regard to the proposed CEOS CIP, the Secretariat will look at the issue of assigning a CCSDS document number.**

**Assignee: Secretariat/Mr. Townley**

**Due Date: May 1998**

**Status: Closed:**

**In accordance with the P2 numbering system, this document, when ready, will be assigned a number in the 650 series**

**97-20. All agencies are to review the proposed wording to the procedures manual in light of Resolution MC-S97-21, and suggest appropriate changes in the wording to the procedures manual to the Secretariat.**

**Assignee: All Member Agencies**

**Due Date: December 15, 1997**

**Status: Several agencies have responded - Defer to later in Agenda**

**97-21. Members of the ad hoc committee established under Resolution MC-F97-1 are to review and comment on the proposed strawman agenda for the May 1998 TSG meeting presented by the TSG Chairman. MC members are also invited to submit comments. All comments should be sent to the TSG Chairman, with a copy to the Secretariat, via e-mail.**

**Assignee: Ad Hoc Committee; Member Agencies**  
**Due Date: February 2, 1998**  
**Status: Closed.**

**Comments received, Agenda revised,  
Meeting held May 11-12, 1998.**

**Fall Management Council Meeting  
Summary of Comments  
on Action Items**

97-11. All Member Agencies should review the latest draft of the TSG Charter and submit comments to the Secretariat.

Assignee: All Member Agencies

Due Date: December 15, 1997

STATUS: **Open** - Some comments received for consideration.

**BNSC comment:**

BNSC is content with the changes suggested by NASA at the Nov. 97 MC apart from PURPOSE which we suggest should read " To guide and coordinate the overall technical activities of the CCSDS"

**INPE comments:**

Departing from NASA proposal (I believe), as discussed in the last MC meeting, held in the U.K.:

COMMENT 1:

Under the Item 'Organization' it is requested by INPE that where it currently mentions:

'Membership of the TSG includes all panel chairmen and working group/subpanel chairmen',

it should say:

'Membership of the TSG includes all panel, working group/subpanel chairmen and member agencies heads-of-delegation'.

In the same fashion that participation of TSG in the forum of MC has been fruitful and opportune, it has also been the same, the other way around. So, INPE requests this -explicit- mentioning in the Charter. It is -also- convenient for justifying before INPE the participation of its head-of- delegation in the TSG meetings.

COMMENT 2:

Also under the Item 'Organization', where it currently mentions:

'At the invitation of the TSG Chairman, agencies will send experts for clarification of technical subjects as required',

it should say:

'At the invitation of the TSG Chairman, with acknowledgment of their heads-of-delegation, agencies may be requested to send experts for clarification of technical subjects, as required'.

It would be certainly desirable, in order to pay attention to the -internal- organization of each (Member, only?) Agency, to give a priori or concomitant acknowledgment to the pertinent head-of-delegation on invitation(s) that may be issued for this reason.

**NASDA comment:**

We don't have any comment with consideration of the comments of (made by) CNES (at the Nov. meeting).

**ESA Comment:**

I agree to the proposed changes of the TSG Charter, but I feel that the relationship between the TSG and the MC is not yet fully clear. The Charter reads that the TSG shall " Provide overall technical advice and counsel to the MC in order to prepare for review of CCSDS Recommendations by the member Agencies". I feel that in practice the scope of the advice to the MC is more extensive. Further it is not clear to me how and in which form this advice should be delivered: by MC members participating into TSG meetings or by senior members of the TSG participating into MC meetings. This uncertainty leads also to the question whether MC members "may" or "should" attend TSG meetings and whether TSG meetings ( in future only every second one ) should at all be co-located with MC meetings. An alternative approach could be, that such co-located ( and therefore restricted ) TSG meetings are fully integrated into MC meetings and the agenda is adjusted accordingly.

I have one minor point with the current text related to the 7th bullet in the para " Mission " , which now reads: \*Develop new critical standards....\* Is the word "critical" here really applicable ?

=====

97-12. All Member Agencies should review and provide inputs to the draft vision statement. Each Member Agency delegate should also state why their agency participates, how they contribute to the activities of CCSDS, and describe the environments in which the agencies anticipate their mission development to occur.

Example: The NASA faster, better, cheaper mission set; i.e., more missions in a shorter period of time.

Assignee: All Member Agencies

Due Date: December 15, 1997

STATUS: **Open** - Some comments received for consideration.

### **BNSC comment:**

Agree with draft vision statement from NASA. BNSC participate in the CCSDS in order to contribute to and influence space data standards to meet our present and future needs. We participate in all panels, particularly Panel 2. Our program is mostly with ESA but we also wish to increase our participation in low cost missions with ESA and other agencies including ground stations and archiving cooperation.

### **INPE Comments:**

We suggest that, in a first opportunity, the ad-hoc committee should consider inviting to their (initial) forum meeting(s), to the best possible extent, well known or recognized experts (from US, Europe, Japan, else) in the pertinent areas being (or to be) covered by the draft vision, for expressing their views on pertinent topics, in the initial phase of the work. These experts may come from industry or from government organizations and should -not-, necessarily, be directly involved with space agencies or activities but, yes, with the main topics behind it (Info. Tech., Telecomms., etc.). In any case, their recognized familiarity with the edge of the technology -or-, with possibly, already 'old' but potentially good technology, with promising potentials in the future, should play a fundamental motivation and contribution in this initiative. For instance, we may feel that the 'emerging' photonic technology tends to play a growing influence in high performance computing -and- telecommunications (minimum delays, maximum throughputs, etc.). Communications protocols would be possibly (made simpler) revolutionized with photonic and optic (end-to-end) links, including optical space-to-space or space-to-ground links, but what 'weight' (if any) in CCSDS future planning, should be given to it? Perhaps, someone (or many) at Bell Labs, Comsat, Northern Telecom, Schlumberger, NEC, etc. (to say a few) may have good indications about it. In another aspect, who can assure that the on going evolution of messaging, directory supported, Weboriented technology information and telecommunications network management tools is not leading to (relatively) simple, (commercial) off-the-shelf, secure, efficient, -open- and, most-of-all, relatively cheap solutions that may comfortably out mode many of the CCSDS protocol and servicing concepts in future application scenarios, and that they may not become adopted by essentially 'private' space agencies, as 'de-facto' standards, while embedding implicit or explicit cross-support and interoperability capabilities? We all know that specific problem domain (non space) oriented tools being accepted today may be redirected to applications never minded (including

space) when they were originally conceived, but that may be easily justifiable when viewed under a different perspective, with the specifically required, pertinent adaptations. Perhaps, the deepest challenge we have in the CCSDS community is to keep our alternatives and sensitivity to eventually adopt (and adapt) 'other' technologies or applications. This is not an easy task, to all of us, in a highly dynamic environment as we are, but we feel, I believe, we have to face it, of course. So, I believe that Adrian (H.), very opportunely, just pointed to us what may be the surfaced part of an (so far) untouched iceberg. I also appreciate your sensibility in dealing with the proposed topic, after the discussions we had, in Chilton, I am sure, we all want to see CCSDS Recommendations being developed, so competently as they have been, although, with an embedded, major possibility of being effectively adopted, in space missions, at large.

Concerning INPE I can reaffirm what I could present in our report, in Chilton. Essentially, I see that our agency commitments with external cooperative programs (ISS, etc.) as the point-of-entry for 'short' term, actual involvement in the application of CCSDS Recommendations, by the agency. On the other hand a 'marketing' oriented, high level document, oriented for a 'management', decision making community, may become an important support to triggering and promoting the use of CCSDS Recommendations in the realm of the agency and related (AEB, MCT) organizations. Otherwise, INPE is struggling with dwindling (competent) human resources of itself to put forward its commitments, due to the economic situation we are facing.

### **NASDA comment:**

We suggest the following as a description of Vision.

"Our vision is to share the benefits among all participants to produce first quality mission results while simultaneously realizing significant cost savings in advocating standardized mission operations across the international space community."

Why does our agency participate CCSDS?

- Realization cross support
- International cooperation
- Share high level technology with other agencies
- Realization to decrease costs

How do we contribute to the activities of CCSDS?

- Review of draft recommendation
- Test for validity
- Include to develop test bed

Description of the environments in which the agencies anticipate their mission development to occur?

- Requirement for low cost

Development in short term.  
Requirement for high reliability

**ESA Comment:**

What is written in the vision statement is generally OK for me; the "faster, better, cheaper" also applies to ESA - however, with priority on "cheaper". There is, in ESA's view, one important aspect missing in the vision statement - which is "cross support". This was and is in our view one very major reason, why ESA ( and we believe also several other Agencies ) participate in the CCSDS standardization activities. I propose to add this aspect.

=====

97-16. All Member Agencies should look at other targets of opportunity to present CCSDS and provide this list to the Secretariat by December 1. Each Agency delegate should follow up on opportunity be identified and explore with the appropriate group the possibility of CCSDS getting involved.

Assignee: Member Agencies  
Due Date: (a) List of opportunities -- December 1, 1997  
(b) Contact appropriate organization - Jan. 15, 1998  
STATUS: **Open** - Some comments received for consideration.

**BNSC comment:**

The first of these is SpaceOps in Tokyo in June 98 and we are involved in this via Panel 2 presentations.

**NASDA comment:**

(At this time) we don't have (any) idea(s) of the opportunities.

**ESA Comment:**

Potential other events to present CCSDS are COSPAR meetings and Telemetry Conferences, the latter taking place regularly both in Europe and in the US (usually California). However, I am not really in a position to follow this up, as I have no contact with suitable conference participants and I never went myself.

=====

97-19. With regard to the proposed CEOS CIP, the Secretariat will look at the issue of assigning a CCSDS document number.

Assignee: Secretariat/Mr. Townley  
Due Date: May 1998  
STATUS: **CLOSED** per Action Item 97-18 above

=====

97-20. All agencies are to review the proposed wording to the procedures manual in light of Resolution MC-S97-21, and suggest appropriate changes in wording to the procedures manual to the Secretariat.

Assignee: All Member Agencies  
Due Date: December 15, 1997  
STATUS: **Open** - Some comments received for consideration.

**BNSC comment:**

BNSC is content with the NASA proposed wording.

**INPE comment:**

It does not seem appropriate to -mix- or to -tie- the issue of software and/or hardware development with that of the development of a Recommendation, namely, when it may be derived from an adopted NWI (New Work Item);

In view of the current contents of the CCSDS Procedures Manual, in its Page 5-1 (Version of May 1994) it would be inappropriate to consider the possible incorporation of a software (or hardware) development (if any) as a pre-condition, passive of legal constraints, for acceptance of a NWI or, even, of a CP proposal. Although CCSDS may not claim that it develops standards, at the same time, it can not affirm that their Recommendations are not intended to become standards, even if SC-13 would not exist, as a point-of-their-entry in the standardization domain of ISO. Incidentally, what consideration and eventual pre-conditioning ISO gives to the software (or hardware) development issue, if any, when a decision is made in its domain for development of a new item for standardization? The development of a Recommendation should be viewed, essentially, as an abstract process, not tied to software or hardware implementations, although they usually become obvious by products resulting from it.

It should be up to the discretion of an Agency or of a group of them, involved in the development of Recommendation related Software and/or Hardware, to apply conditions on the opening to other parties of such products, which are -not, in principle, Recommendations, or standards by themselves, and should not be considered as such by CCSDS, I would understand. Conversely, development of a

Recommendation should not be mixed or tied to the development of software and/or hardware. It is understood that software and/or hardware development results from the development of a Recommendation but are (or should) not (be) Recommendations by themselves.

Recommendations are the CCSDS essential products. If a new wording with explicit mentioning of software and/or hardware -has- to be made in Page 5-1 of the Procedures Manual, it is suggested that the content of the above item (3) may be, with proper wording, be adapted to that context.

**NASDA comment:**

In the proposal for revision (of the) Procedure Manual ,

- (a) "Duties and Responsibilities"
- (b) "NEW WORK ITEM",

there are descriptions that agencies share hardware and software with other agencies.

We agree (with) this policy and think that agencies should make a effort to realize that. But now, for realization, many agencies as well as NASDA have many problems (license, legal problems). Then, if this description means duty, that will be a problem. In the phrase of "shall seek exemption" in the description of above-mentioned , "shall" means duty as "must". But, because "seek" is used for a verb, we think they are requirements with best effort. Is Our understanding correct? If it is correct, proposal of Secretariat is no problem.

**ESA Comment:**

Although I agreed at the May 1997 to the resolution MC-S97-21 and still personally support its spirit as far as I understand it, I felt a bit uneasy when I saw the resulting changes written down in the procedures manual ( in particular the changes in sections 3.1.1.2 and 5.1.1 ). So I finally decided to ask the Head of the ESOC Contracts Division for advice. He also sees the potential benefit and would personally be inclined to support it, but he is not convinced that on the basis of the current ESA Industrial Policy and current Intellectual Property Rights an exemption would be granted for a major development. In this situation it is, in his view, not very honest to agree to the procedure manual modifications, without asking formal permission to the responsible ESA bodies. These are: 1) the Office for International and Legal Affairs and 2) the Director for Industrial Matters and Technology. Such procedure is expected to stir up some noise, has therefore to be well prepared and will also take time. The contacted person also proposes to do it only if we are expecting a real case in the foreseeable future.

In any case, if we ask for formal ESA permission for the proposed Procedure Manual changes, we have to be prepared to clarify in more detail the underlying objective and to definitely quote one or two potential cases. Here I definitely see a problem: even the planned development of SLE services at JPL and ESOC is not a candidate for application of this procedure, due to existing infrastructure and time constraints. I fear that the former reason will always apply for mayor Agency implementations. I am therefore asking myself the question, whether our development sharing intentions are really realistic and whether I should initiate my formal request to the responsible ESA bodies. In such case I need better information on the two points raised above: more detailed objectives and potential cases. Can this be provided ? Your advice would be appreciated. I would also be interested to hear the opinion of my MCcolleagues. I am sorry, that this matter is getting more complicated than I initially thought.

It should also be noted, that ESA could - in the absence of a procedure change - still continue to make under certain circumstances minor software packages available to other Agencies for applications comparable to those developed by Panel 2.

As concerns the other proposed Procedure Manual changes , I herewith agree to them.

#### **NASA Comment:**

Propose the following text be placed at the end of Section 5.1.1 the following:

“A specific plan for development of associated software shall be included in proposed CCSDS NWTís, if applicable. In preparing such a plan, participating Agencies should make reasonable efforts to identify the specific benefits of sharing software, such as the quid-pro advantages of cooperative sharing.

Participating Agencies shall also use reasonable efforts to seek exemption (as necessary) from their individual Agency’s constraints on distribution of the resulting software for its free and unrestricted use by all other participating Agencies, based on these benefits of sharing software.”

=====

97-21           Members of the ad hoc committee established under Resolution MC-F97-1 are to review and comment on the proposed strawman agenda for the May 1998 TSG meeting presented by the TSG Chairman. MC members are also invited to submit comments. All comments should be sent to the TSG Chairman, with a copy to the Secretariat, via e-mail.

Assignee:    Ad Hoc Committee Member & Member Agencies  
Due Date:    February 2, 1998  
STATUS:      **CLOSED**

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## **ATTACHMENT E**

### **USE OF CCSDS RECOMMENDATIONS BY INTERNATIONAL SPACE STATION (ISS)**

## **Overview of ISS Use of CCSDS**

- **Commanding, including memory load and file transfer, is CCSDS**
- **Downlink telemetry packets are CCSDS**
- **Memory and file dumps are CCSDS**
- **US Operating System/ESA Attached Payload Module interface totally CCSDS**

**Note: Copies of briefings are available for reproduction & distribution**

## **ISSA Assessment of CCSDS Utility**

### **Constraints**

- **APID space too small**
- **Sequence count too large**
- **More SCID values needed**
- **Need standard for defining the inter-process application interfaces**

## **ISSA Assessment of CCSDS Utility**

### **Contributions**

**“...ISSA is using the standard with enthusiasm.”**

**“...CCSDS has been an invaluable tool in pulling the station together...”**

**“All the upper layer protocols are built on it except the local data acquisition...”**

**“The CCSDS Recommendations were exactly right for meeting ISSA command and telemetry needs.”**

**“It would have taken months to negotiate a functionally equivalent implementation....and would still have had ‘special cases.’”**

**“The Recommendations provided the needed ‘authority’ to get everyone on the same page.”**

**“The cost savings achieved as a result of the use of the CCSDS Recommendations were immeasurable....”**

**ATTACHMENT F**

**INTERNATIONAL SPACE STATION  
COMMUNICATIONS USE OF CCSDS**

***International Space Station  
Communications  
Use of CCSDS  
12 May 1998***

**Larry Muzny**





## ISS Communications

- **Three Communication Systems on the ISS uses CCSDS Packet Processing**
  - **S-Band System**
    - Forward Link (Uplink)
    - Return Link (Downlink)
  - **Ku-Band System**
    - Return Link (Downlink)
  - **Early Communication (ECOMM) System**
    - Forward Link (Uplink)
    - Return Link (Downlink)
- **Documented in the International Space Station United States On-Orbit Segment to Ground (Through Tracking and Data Relay Satellite System) Interface Control Document, SSP-42018**



## ISS S-Band Characteristics

- The ISS S-Band Provides Telemetry Downlink, Command Uplink, and Voice Data Communications between the ISS and The Mission Control Center via the Tracking and Relay Satellite System (TDRSS)

### S-Band Has Two Data Rates:

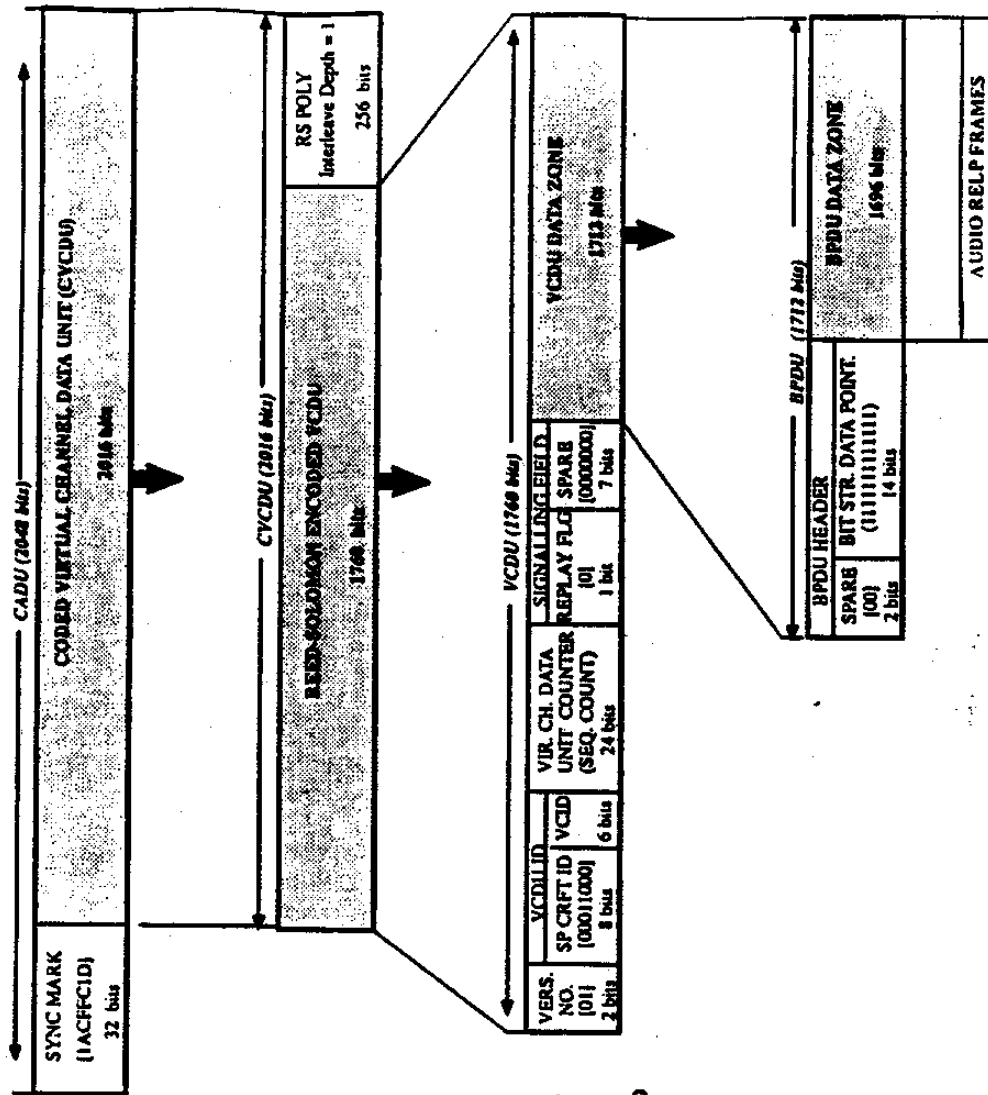
- Normal Data Rates
  - 72 Kb/s Uplink for Command and Audio
  - 192 Kb/s Downlink for Core Telemetry and Audio
- Low Data Rates
  - 6 Kb/s Uplink for Command
  - 12 Kb/s Downlink for Core Telemetry

## ISS S-Band Downlink Characteristics (ISS to MCC)

- Downlink Virtual Channel Data Types
  - Digital Audio: 2 Virtual Channels Utilizing Bit Stream Service (9.6 Kb/s per channel)
  - Core Telemetry : 1 Virtual Channel Utilizing Path (Packet) Service
  - Fill : 1 Virtual Channel
- Reed Solomon Check Symbols is Appended for Grade-2 Service
- S-Band Downlink Construction
  - Channel Access Data Unit (CADU) consist of a 32 Bit Sync and 252 Octet Coded Virtual Channel Data Unit (CVCDU)
  - Reed Solomon Check Symbols is Appended to the Virtual Channel Data Unit (VCDU) To Form CVCDU To Support Grade-2 Service
  - VCDU Consist of a 6 Octet Header and a 214 Octet Data Zone
  - Multiplex Protocol Data Unit (MPDU) Consist of a 2 Octet Header and 212 Octet Data Zone for ISS Core Telemetry CCSDS Packets
  - Bit Stream Protocol Data Unit (BPDU) Consist of 2 Octet Header and 212 Octet Data Field for Audio Bit Stream Data

## 88

# ISS S-Band Downlink - Voice Data



## S-BAND FEP

- NETWORK INTERFACE FUNCTION
- FRAME SYNCHRONIZATION
- BEST SOURCE SELECTION
- SERIALIZE
- REMOVE SYNC MARK

## S-BAND FEP

- ERROR CONTROL DECODING
- REED-SOLOMON (255,223)
- UTILIZING A SHORTENED CODE BLOCK
- CODE BLOCK = (252,220)
- 3 OCTETS OF VIRTUAL FILL (ALL 0's)
- PRECEDES DATA BLOCK

## S-BAND FEP

- VCDU DIS-ASSEMBLY FUNCTION
- DEFINITION: VIRTUAL CHANNEL DATA UNIT COUNTER-  
A sequential count of the total number  
of VCDUs for each VCID - Issues for 618 data  
channel
- SEE ABOVE FOR VCID VALUE AND OTHER HEADER INFO

## S-BAND FEP

- BPDU DIS-ASSEMBLY FUNCTION
- SEE ABOVE FOR HEADER INFO.

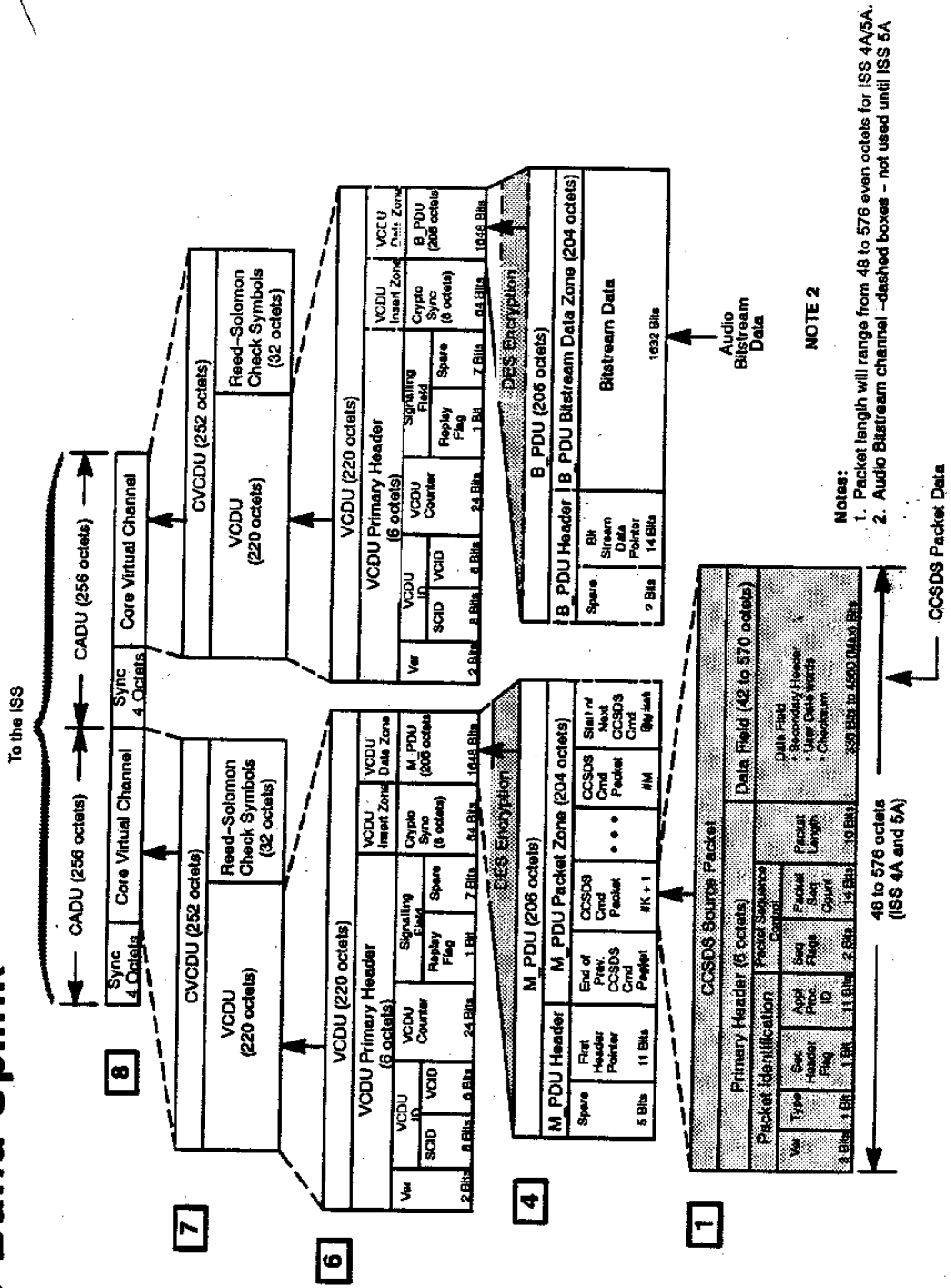
## AUDIO PROCESSING

- RELP DECOMPRESSION
- CONVERT FROM 9.6
- BUFFERING
- D/A CONVERSION
- SEE ABOVE FOR DIGITAL FORMAT
- GAIN COMPENSATION
- TRANSMIT ANALOG SIGNAL TO DVIS

## ISS S-Band Uplink Characteristics (MCC to ISS)

- Uplink Virtual Channel Data Types
  - Digital Audio: 2 Virtual Channels Utilizing Bit Stream Service (9.6 Kb/s per channel)
  - Command/Data Load/File Transfer : 1 Virtual Channel Utilizing Path (Packet) Service
  - Fill : 1 Virtual Channel
- S-Band Uplink Data Construction
  - Channel Access Data Unit (CADU) consist of a 32 Bit Sync and 252 Octet Coded Virtual Channel Data Unit
  - Reed Solomon Check Symbols is Appended to the Virtual Channel Data Unit To Form CVCDU To Provide Grade-2 Service
  - Uplink CVCDUs are Randomized Using the Recommended Bit Stream Transition Generation Function
  - VCDUs are Encrypted Utilizing DES Encryption Standard
  - VCDU Consist of a 6 Octet Header, 8 Octet Crypto Sync, and a 206 Byte Data Zone
  - Bit Stream Protocol Data Unit (BPDU) Consist of 2 Octet Header and 204 Octet Data Field for Audio Bit Stream Data
  - Multiplex Protocol Data Unit (MPDU) Consist of a 2 Octet Header and 204 Octet Data Zone for ISS Command Data Load/File Transfer CCSDS Packets

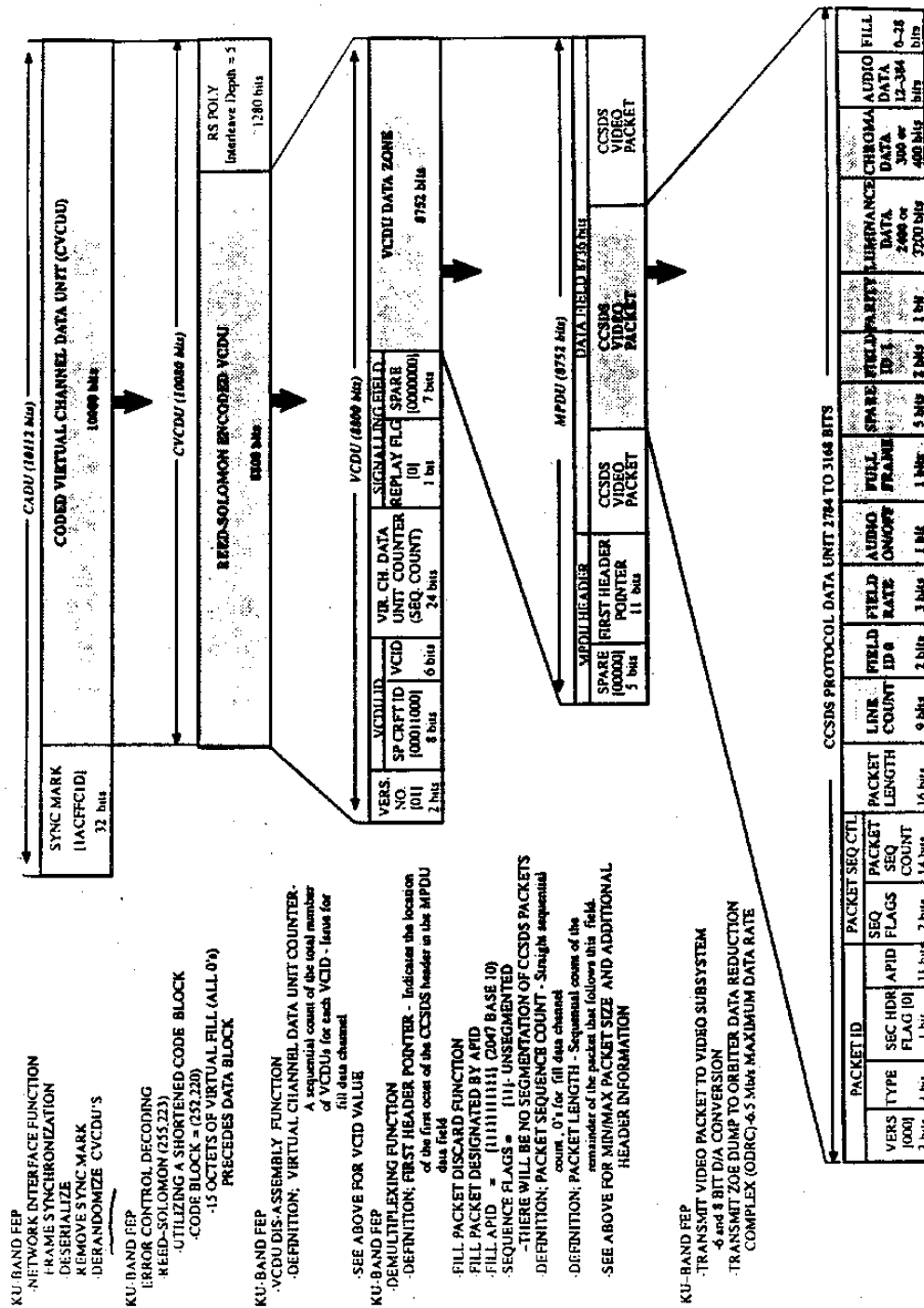
# ISS S-Band Uplink



## ISS Ku-Band Downlink Characteristics

- The ISS Ku-Band Provides Downlink Communications from the ISS to Both MCC and MSFC for Payload Telemetry and Video Data via TDRSS.
  - Ku-Band Downlink Rate is 50 Mb/s (Fixed Rate)
- ISS Ku-Band Downlink Virtual Channels
 

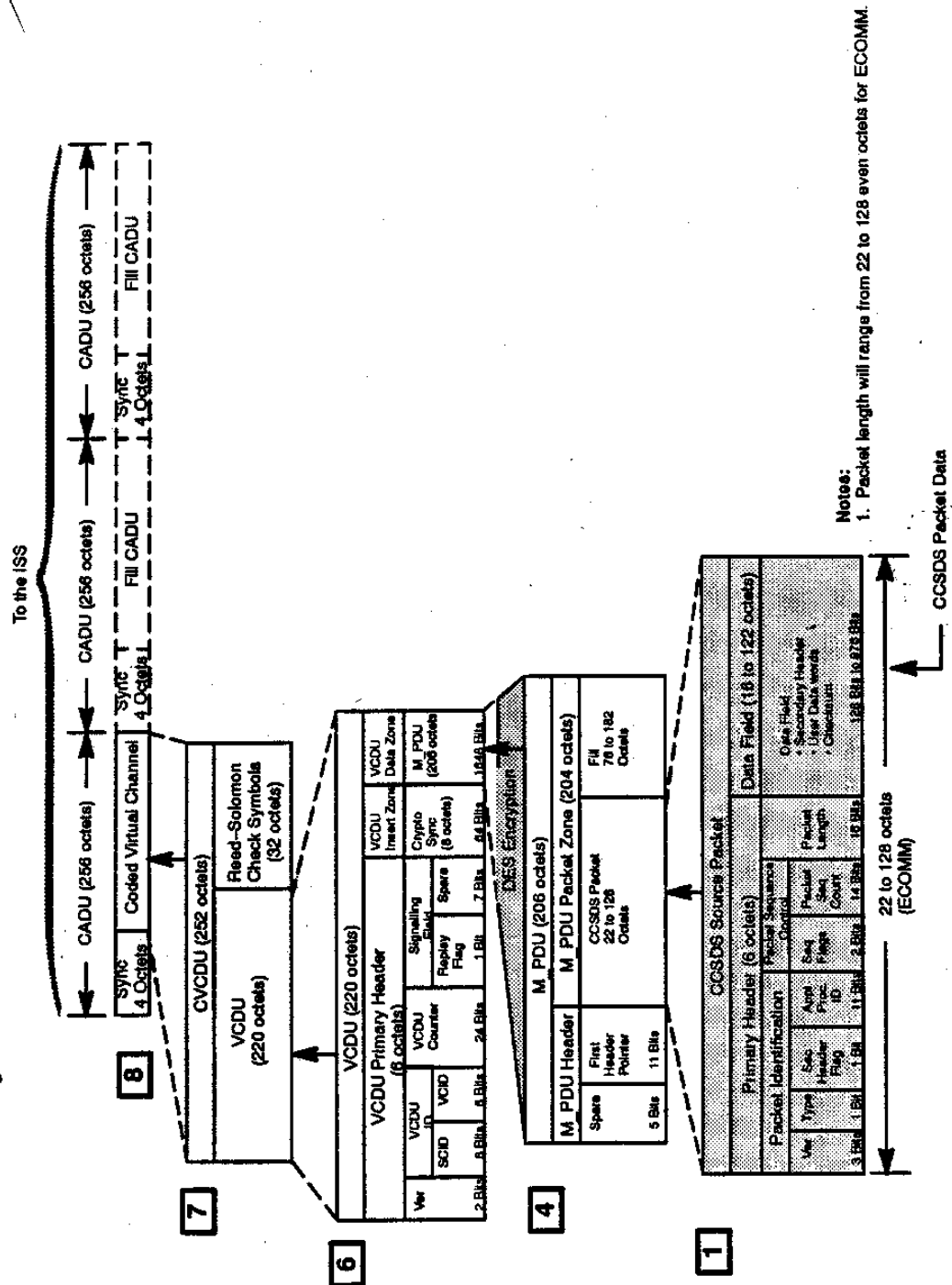
– Digital Video	4 Virtual Channels Utilizing CCSDS Packets
– Payload Data	8 Virtual Channels Utilizing Either Bit Stream Service or Path (Packet Service)
– Fill Data	1 Virtual Channel
- Ku-Band Construction
  - Virtual Channel Data Units (VCDUs) are Reed Solomon Encoded Using Recommended (255, 223) Encoding With Symbol Interleaving Dept of 5 to Provide Grade 2 Service
  - Downlink CVCDUs are Randomized Using the Recommended Bit Stream Transition Generation Function



## ISS ECOMM Characteristics

- The ISS ECOMM Provides Early Communications Between the ISS and MCC for Telemetry Downlink and Command Uplink via TDRSS)
  - ECOMM S-Band Uplink Data Rate is 6 Kb/s (4.781 Kb/s Throughput)
  - ECOMM Downlink Data Rate is 20.48 Kb/s (15.36 Kb/s Throughput)
- Same As ISS ACS S-Band Uplink and Downlink with the Following Exceptions
  - Source CCSDS Packet Data Field is limited to 16 to 122 Octets for Uplink and Fixed to 186 Octets for the Downlink
  - Forward Link MPDU Contains Two CCSDS Source Packets
    - Command Packets Always Starts At The Beginning of the MPDU Packet Data Zone and is 22-128 Octets Long
    - The Second Packet is a Fill CCSDS Packet
  - Return Link MPDU contains Two CCSDS Source Packets
    - Telemetry Packets Always Starts At The Beginning of the MPDU Packet Data Zone and is 192 Octets Fixed Length
    - The Second Packet is a 20 Octets Fill CCSDS to complete the MPDU.

# ISS ECOMM Uplink



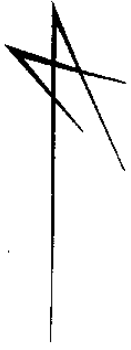


## MCC ISS Downlink Telemetry Data Flow



- MCC Utilizes a Commercial Off The Shelf (COTS) Front End Processor (FEP) to Process the ISS Downlink Telemetry Received From the Nascom Space Network
- MCC ISS FEP Components
  - LMTI 550 Telemetry Processor Performs Following CCSDS Processing
    - CADU Synchronization
    - Reed Solomon Decoding and Error Correction
    - VCDU Processing (VCID Selection; VCDU Validation)
    - Converts Voice Bit Stream BPDUs into MCC Compatible Voice Signals and Interface to the MCC Digital Voice Intercommunications System
    - Processes MPDUs from Core Telemetry VCDUs
    - APID Filtering and CCSDS Packet Validation (Sequence and Length)

## MCC ISS Downlink Telemetry Data Flow



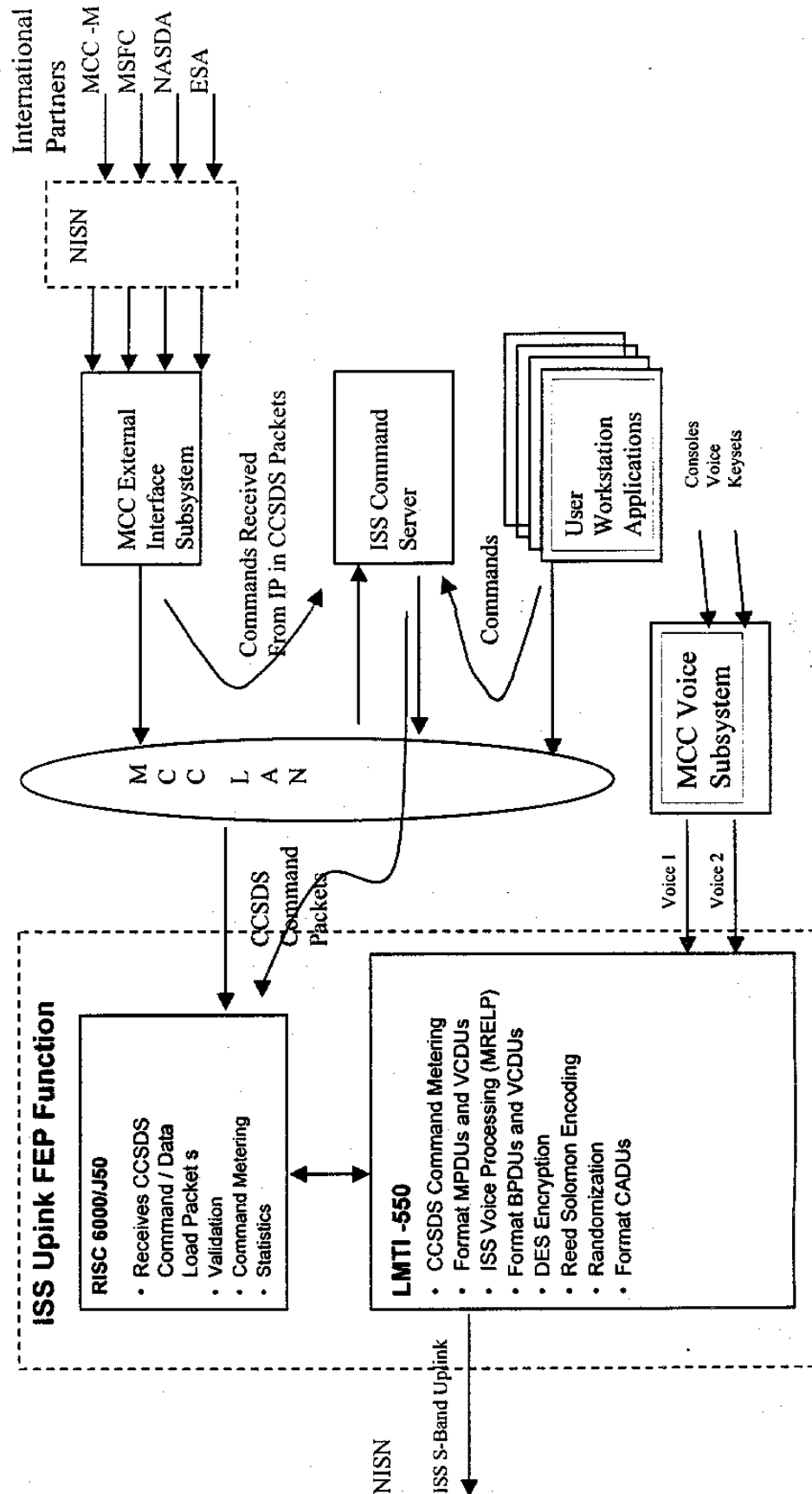
- **MCC ISS FEP Components Cont.**
  - **RISC 6000/J50 Processor**
    - Packet Validation and Demultiplexing
    - Parameter Calibration
    - Formats Data Into A MCC Common Multicast Message for Distribution to MCC Archive System, MCC External Interface Subsystem, MCC Workstation Applications
    - Routes Data Destined to International Partners to the MCC External Interface System (EIS)
    - Routes Command Response Data and Data Dumps to the MCC Command Server For Processing
- **MCC Archive System Receives MCC Common Multicast Message**
  - Receives the ISS FEP Common Multicast Message via the MCC LANs
  - Stores/Retrieves by Parameter Unique Identifier (PUI)

## MCC ISS Downlink Telemetry Data Flow



- **MCC External Interface Subsystem**
  - Receives the ISS FEP Common Multicast Message via the MCC LANs
  - Receives Selected ISS Downlink Data Types directly from the ISS Downlink FEP via the MCC LANs (APM Packets, and Russian Contingency Telemetry Packets)
  - Sends Selected ISS Downlink Data to the International Partners in a CCSDS Packet Structure via the NISN (Point-to-Point Path Service)
  - Receives USOS Data Received From the Russian Segment in CCSDS Packets, and Output to the MCC ISS FEP For Processing
- **MCC Video Converter Units**
  - Receives ISS Ku-Band Video CCSDS Packets from the ISS Downlink FEPS
  - Converts Each ISS Ku-Band Video Channel to Standard NTSC Video
  - Sends the NTSC Video Channels to the MCC Video System for Distribution
- **MCC Command Server**
  - Receives ISS Downlink Command Responses and File Dumps from the ISS FEPS

# MCC ISS Uplink Command and Voice Data Flow



## MCC ISS Uplink Command Data Flow



- **MCC External Interface Subsystem**
  - Receives Payload Commands from the International Partners (IP) in CCSDS Packets, and routes to the Command Server
- **MCC Command Server**
  - Receives Internally Generated Command Messages From The MCC Workstation Applications
  - Formats MCC Internal Commands into CCSDS Packets
  - Receives the IP commands from the EIS in CCSDS packets
  - Validates, Adds Authentication GMT Time, Recalculates the Checksum, and Output the CCSDS Commands Packets to the MCC ISS FEP for Uplink
  - Meters the Command Packets Out Based Upon the Uplink Rate

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## **ATTACHMENT G**

### **USE OF CCSDS RECOMMENDATIONS ON INTERNATIONAL SPACE STATION**



## Use of CCSDS Recommendations on International Space Station

Bob Byington  
281-283-5425  
robert.w.byington@boeing.com

12 May 1998



### Topics

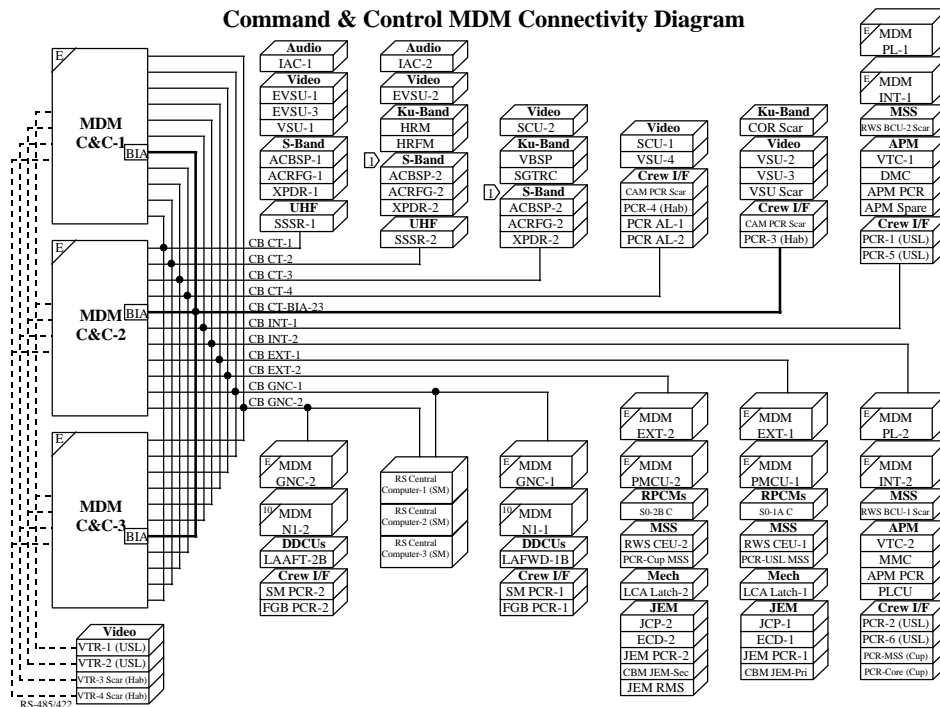
- ISS Command and Telemetry Link Characteristics - Larry Muzny (MCC-Houston)
- ISS Use of CCSDS - Bob Byington - ISS Flight Software
  - ISS Software Overview
  - Overview of ISS use of CCSDS
  - Commands
  - Telemetry
  - Cyclic Status
  - High Crimes and Misdemeanors



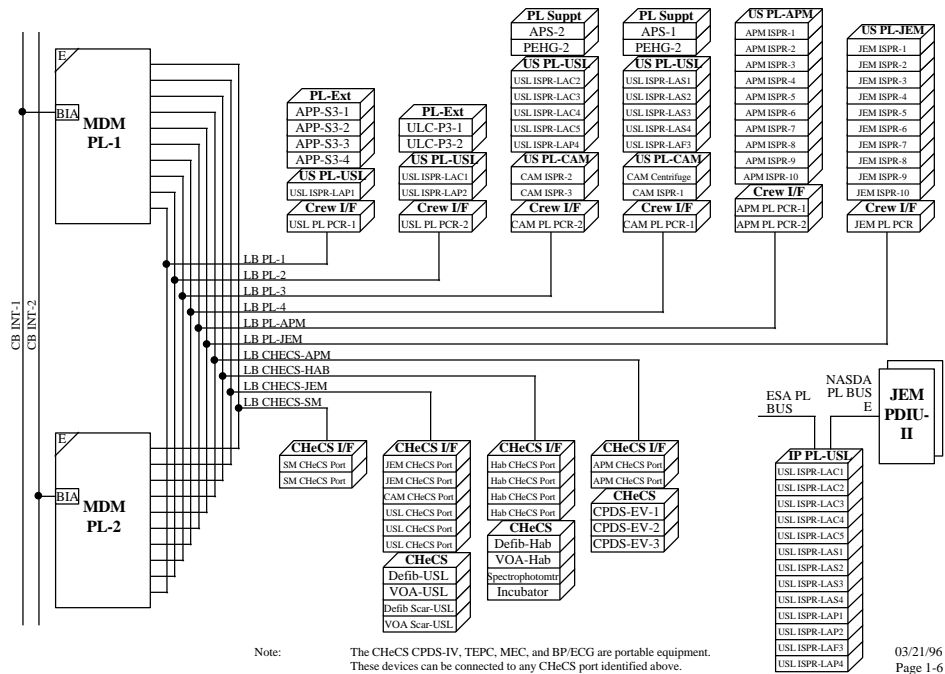
# Architecture Highlights

- Onboard system comprises
  - 105 MIL-STD-1553B data buses
  - 50 386-based MDMs in the US Segment
    - 5 MDMs have 300 MB disks
  - 21 directly connected International Partner processors
  - 550 Firmware Controllers
  - up to 8 crew laptops (Thinkpad 765E) connected to core domain
  - up to 5 crew laptops connected to payload domain

Command & Control MDM Connectivity Diagram



### Payload MDM Connectivity Diagram

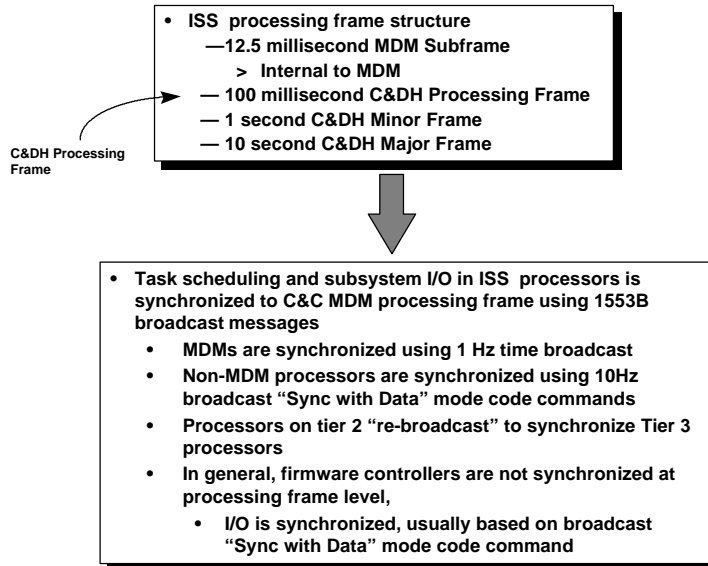


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6

### Processing Frames & Synchronization

6 05/18/98 08:53 AM



# REPORT OF THE MANAGEMENT COUNCIL - MEETING MINUTES

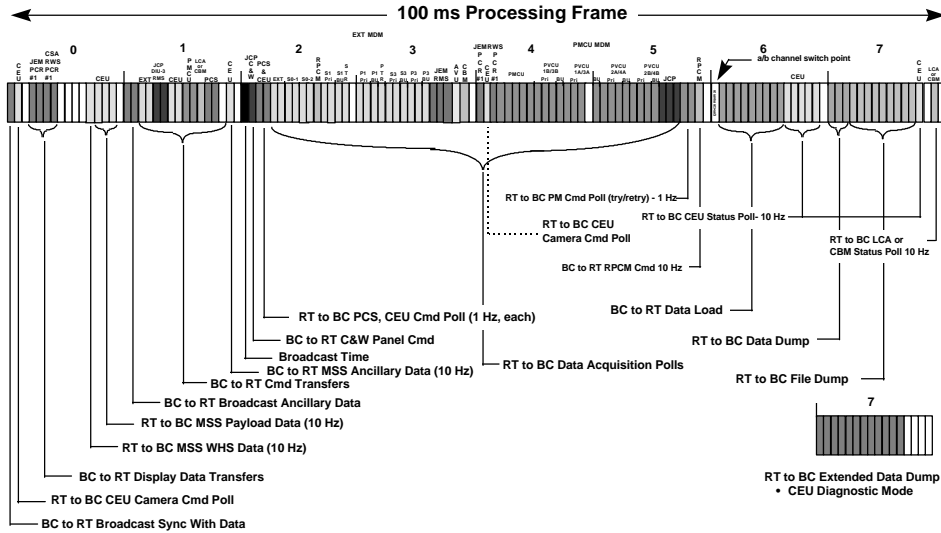


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## 1553B Bus I/O Profile CB EXT-1 Assembly Complete

7

7 05/18/98 08:53 AM



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## Overview of ISS Use of CCSDS

8

8 05/18/98 08:53 AM

- Commanding, including memory load and file transfer is CCSDS
  - per path service recommendations
- Downlink telemetry packets are CCSDS
  - per path service recommendations
- Payload telemetry is CCSDS packets via Ku-band downlink
- ZOE telemetry is CCSDS packets via Ku-band downlink
- Broadcast Time is CCSDS Segmented Time and is used by MDM hardware / software to synchronize
- Onboard cyclic status
  - Mostly not CCSDS format
- USOS / ESA APM interface is the only interface that is totally CCSDS

# REPORT OF THE MANAGEMENT COUNCIL - MEETING MINUTES



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## Commands

9

9 05/18/98 08:53 AM

- ISS implements 2 basic command types
  - Standard commands
  - Data Load and File Transfer commands
- Commands originate as CCSDS formatted commands
  - US and Russian uplink
  - Crew laptops
  - Flight software
  - Procedure executors
- Routed per CCSDS Path Service until they reach a "CCSDS end point"
  - 50 MDMs
  - 21 IP Processors
  - 13 US Laptops
  - 64 Payload Racks
  - ~50 of the FWCs
- When they reach the CCSDS endpoint, they are
  - Executed
  - or converted to FWC format and transferred to FWC



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## Commands - Continued

10

10 05/18/98 08:53 AM

- ISSA Command formats are per Path Service Recommendations in CCSDS 701.0-B-2
- All commands contain a
  - CCSDS Primary Header
  - CCSDS Secondary Header
  - Command-Specific Data (If needed)
  - Checksum (one 16-bit word)
- Maximum Standard Command size is 64 words
- Maximum Data Load/File Transfer Command size is 288 words
- Command routing is via the Application Process ID in the CCSDS Primary Header
- APID is also used to route the Command Response to the source (if required)

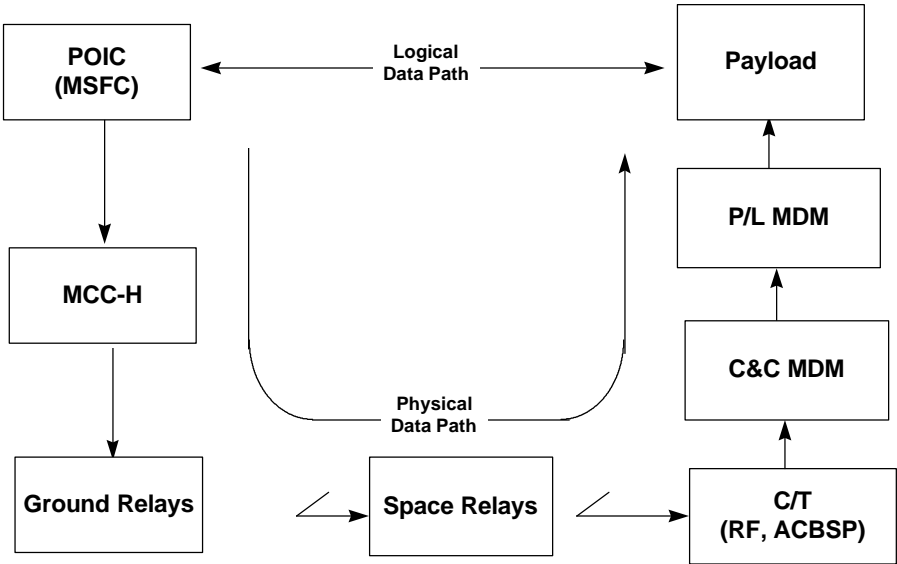
SOURCE	RATE/SEC	NOTES
MCC-H	16	8 STD / 8 DATA LOAD
MCC-M	1	
PCS	8	
OIU DIRECT	1	OIU CAN XMIT THRU 1 INTERFACE
OIU UHF	0	RATE IS 1 / SEC IF ACTIVE
GP TT QUEUE	1	
COMM TT QUEUE	1	
SAFING LIST	1	
FILE XFER -DOWN	10	
FILE XFER -UP	10	
TIMELINER	10	
OSTP	1	
PL MDM	10	5 REQS + 5 CMDS IN RESPONSE
CEU	2	1 REQS +1 CMDS IN RESPONSE
PM	2	1 REQS +1 CMDS IN RESPONSE
EXT	2	1 REQS +1 CMDS IN RESPONSE
GNC	2	1 REQS +1 CMDS IN RESPONSE
TOTAL	78	



**CCSDS Path Service**  
**Command Routing - Ground to Space**

11

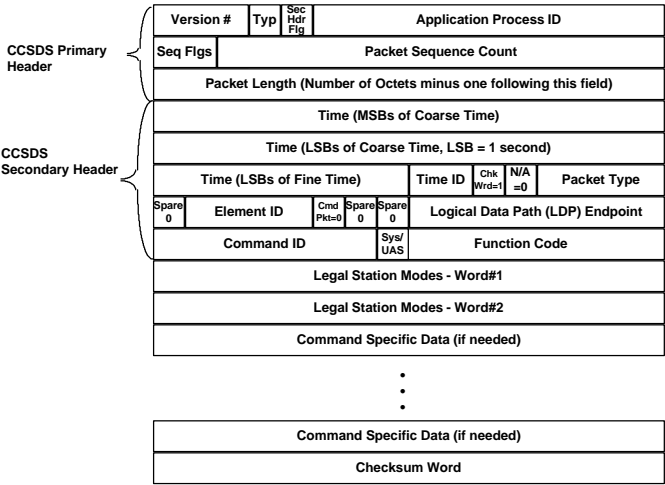
11 05/18/98 08:53 AM



**Command Format - USOS, CSA, MPLM**

12

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## CCSDS Telemetry

13

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- ISS telemetry is CCSDS format and uses path service recommendations for all downlinks

Format	Path	Bandwidth	# of minor frames	Duration
CCS to S-band High Rate	S-band->MCC-H	139.8kbps	100	10 Seconds
CCS to S-band Low Rate	S-band->MCC-H	9.9kbps	100	60 to 150 Seconds
CCS to Orbiter (direct)	OIU->Orbiter->MCC-H	15.36kbps	100	10 Seconds
CCS to Orbiter (uhf)	SSSR->Orbiter->MCC-H	6.240kbps	100	10 Seconds
CCS to Service Module	SM ->MCC-M->MCC-H	23.04kbps	100	20 Seconds
CCS to ECOMM	ECOMM to MCC-H	15.36kbps	100	10 Seconds

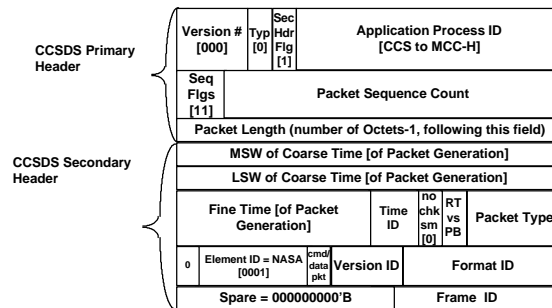


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## CCSDS Header - USOS Data & Telemetry Packets

14

14 05/18/98 08:53 AM

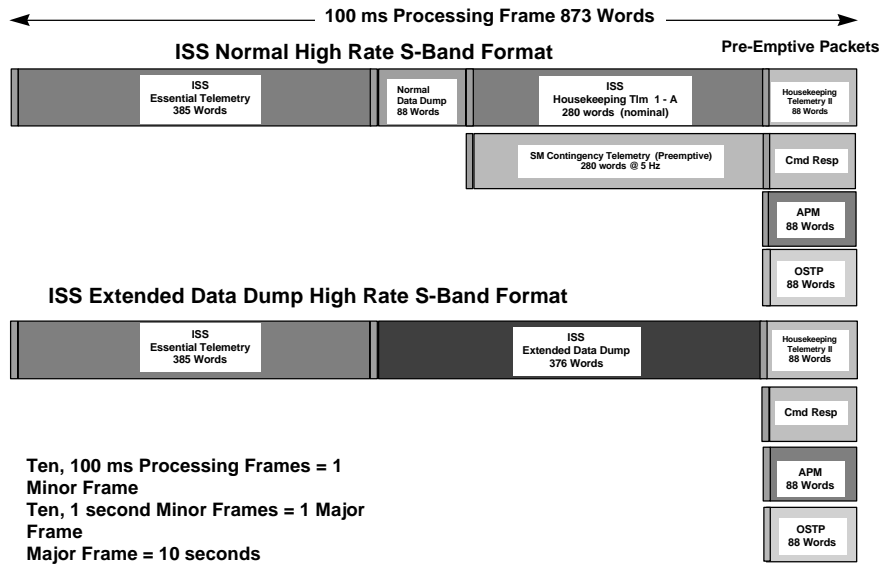




## High Rate S-band Composite Format

15

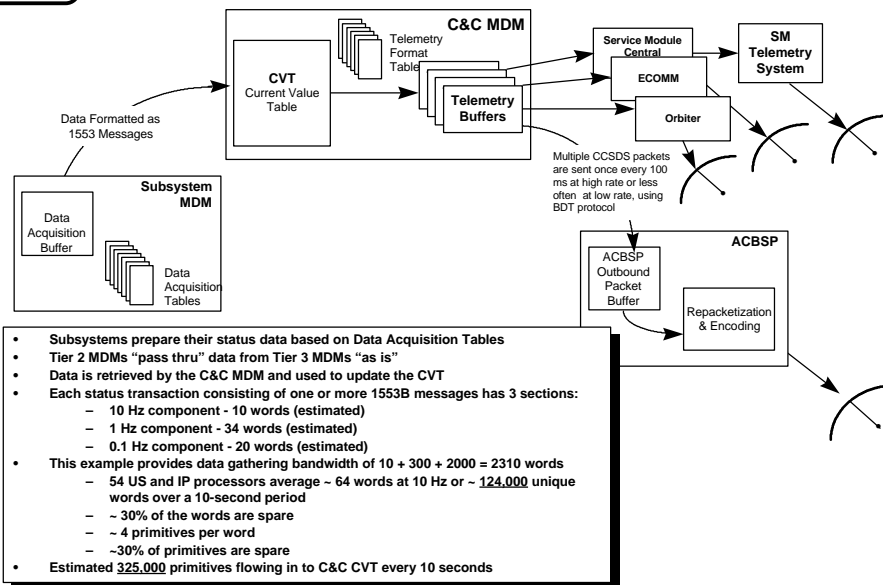
15 05/18/98 08:53 AM



## Status Data Acquisition

16

16 05/18/98 08:53 AM



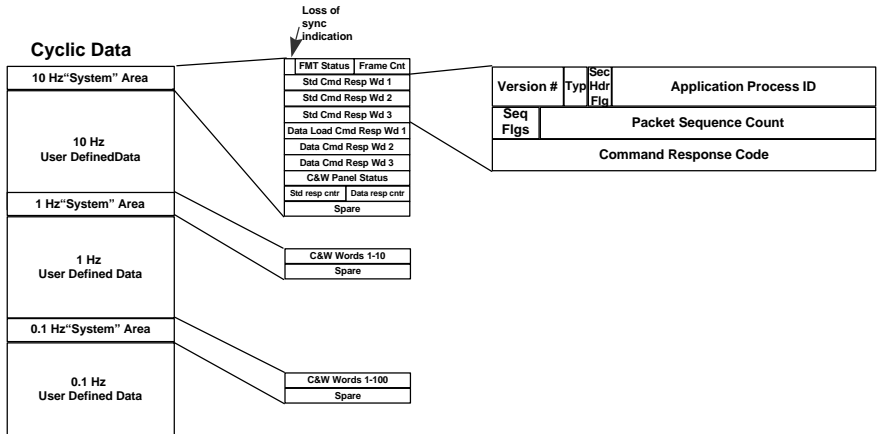


## Status Data Structure

17

17 05/18/98 08:53 AM

- Standard structure and format has been agreed to by program participants including IPs
- Includes separate responses for Standard vs Data Load Commands
- Includes dedicated Caution and Warning event bits



## Acquired Data: CVT Structure

18

18 05/18/98 08:53 AM

INT MDM	10 Hz	1 Hz	1 Hz	1 Hz	1 Hz	1 Hz	1 Hz	1 Hz	1 Hz	1 Hz	1 Hz	1 Hz	1 Hz	tenth Hz	tenth Hz	...	tenth Hz
EXT MDM	10 Hz	1 Hz	1 Hz	1 Hz	1 Hz	1 Hz	1 Hz	1 Hz	1 Hz	1 Hz	1 Hz	1 Hz	tenth Hz	tenth Hz	...	tenth Hz	
GNC MDM	10 Hz	1 Hz	1 Hz	1 Hz	1 Hz	1 Hz	1 Hz	1 Hz	1 Hz	1 Hz	1 Hz	1 Hz	1 Hz	1 Hz	tnth Hz	tnth Hz	...

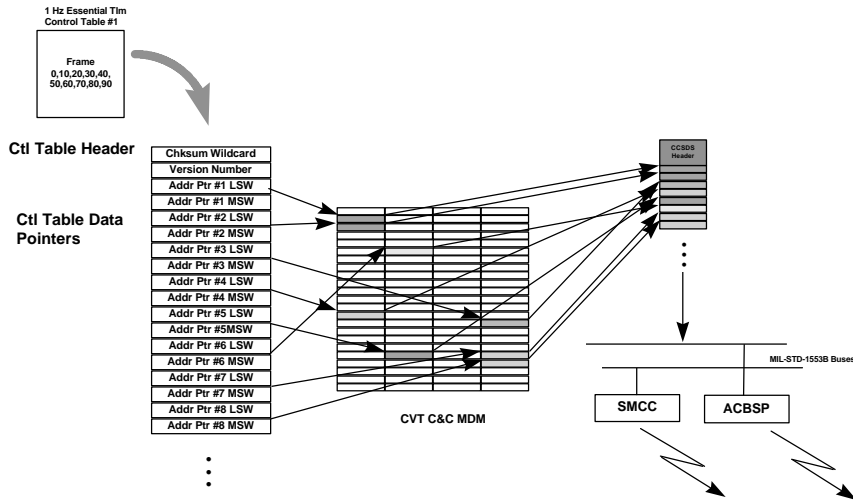
- 10 Hz data block overwritten every processing frame
- 1 Hz data written to CVT over 10 processing frames
- Tenth Hz data written to CVT over 100 processing frames
- Different processors have different 10, 1, and 0.1 Hz rate group boundaries



## Packet Generation

19

19 05/18/98 08:53 AM



## High Crimes and Misdemeanors

20

20 05/18/98 08:53 AM

- ① Type bit is used to extend the APID space
  - There are too many sources and destinations on ISS
    - Type=0 are system APIDs
    - Type=1 are payload APIDs
  - Routing nodes implement two APID routing tables, if necessary
- ② The same APID is used for multiple command paths
  - MCC-H supports one command uplink at a time
- ③ Cyclic status is generally not CCSDS format or path service
  - 1553B subaddresses used to define logical connections
  - Data is pass-thru to C&C CVT
- ④ Data and file dump are not CCSDS path service
  - Combination of 1553B subaddresses "set up" commands are used to define logical connections
  - Data is pass-thru to C&C CVT
- ⑤ MCC-H inserts fill words inside the packet if command length is less than 48 octets
- ⑥ A parameter in the secondary header is used by C&C to distinguish between Standard commands and Data Load / File Transfer commands

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## **ATTACHMENT H**

### **USE OF CCSDS RECOMMENDED STANDARDS BY CURRENT AND PLANNED INTERNATIONAL SPACE MISSIONS**

**Missions Using CCSDS TLM/TC Formats**

Mission		Lead Agency	Launch Date	CCSDS TLM	CCSDS TC
ERS-1	ESA Remote Sensing Satellite 1	ESA	Jul-91	partial	not used
SAMPEX (SMEX-1)	Solar, Anomalous and Magnetospheric Particle Explorer (Small Explorer 1)	NASA/ GSFC	Jul-92	full	full
EURECA	European Retrieval Carrier satellite	ESA	Jul-92	full	partial
Spacelab-Deutsche 2		DLR	Apr-93	partial	not used
STRV-1 A/B	Space Technology Research Vehicles 1A/1B	BNSC	Jun-94	full	full
ERS-2	ESA Remote Sensing Satellite 2	ESA	Apr-95	partial	not used
ISO	Infrared Space Observatory	ESA	Nov-95	partial	not used
SOHO	SOHO International Solar Terrestrial Physics Program (ISTP/COSTR)	ESA	Dec-95	full	not used
ROSSI XTE	Rossi X-Ray Timing Explorer	NASA/ GSFC	Dec-95	full	full
NEAR	Near Earth Asteroid Rendezvous (NEAR) (Discovery Program 1)	APL	Feb-96	full	full
BeppoSAX	Satellite per Astronomia X ("Beppo" in honor of Giuseppe Occhialini)	ASI	Apr-96	full	not used
Cluster		ESA	Jun-96	Partial	not used
TOMS EP-1	The Total Ozone Mapping Spectrometer Earth Probe	NASA/ GSFC	Jul-96	partial	not used
FAST (SMEX-2)	Fast Auroral Snapshot Explorer (FAST)	NASA/ GSFC	Aug-96	full	full
MGS	Mars Global Surveyor	NASA/ JPL	Nov-96	full	full
MPF	Mars Pathfinder (Discovery Program 2)	NASA/ JPL	Dec-96	full	partial
ARIANE 5		CNES	Various	full	not used
ACE	Advance Composition Explorer	NASA/ GSFC	Aug-97	partial	not used <sup>1</sup>
Hotbird-3		EUTELS AT	Sep-97	full	not used
Cassini	Cassini/Huygens Mission to Saturn	NASA/ JPL	Oct-97	full	full
TEAMSAT	Technology, science and Education experiments Added to MaqSAT	ESA	Oct-97	full	full
YES	Young Engineers' Satellite	ESA	Oct-97	full	full

## REPORT OF THE MANAGEMENT COUNCIL - MEETING MINUTES

Mission		Lead Agency	Launch Date	CCSDS TLM	CCSDS TC
ETS-VII	Engineering Test Satellite VII	NASDA	Nov-97	full	full
TRMM	Tropical Rainfall Measuring Mission	NASDA	Nov-97	full	full
EUTELSAT-F1	European Telecom. Satellite	EUTELS AT	Jan-98	partial	full
Lunar Prospector	Lunar Prospector	NASA/ ARC	Jan-98	full	full
SNOE	Student Nitric Oxide Experiment (SNOE)	U of Col, LASP	Jan-98	full	partial
TRACE (SMEX-4)	Transition Region and Coronal Explorer (Small Explorer 4)	NASA/ GSFC	Mar-98	full	full
EOS AM-1	Earth Observing System AM-1	NASA/ GSFC	Jun-98	full	full
STRV-1 C/D	Space Technology Research Vehicle (STRV-1 C/D)	BNSC	Jun-98	full	full
CATSAT (STEDI 3)	Cooperative Astrophysics and Technology SATellite (Student Explorer Demonstration Initiative 3)	U of NH	Jul-98	full <sup>2</sup>	not used
DS-1 (NMP)	Deep Space 1 (New Millenium Program)	NASA/ JPL	Jul-98	full	full
Landsat-7	Landsat 7	NASA/ GSFC	Jul-98	partial	not used <sup>1</sup>
Meteor-3M/ SAGE III	Stratospheric Aerosol and Gas Experiment 3	RSA/ NASA	Aug-98	partial	not used
WIRE (SMEX-5)	Wide-Field Infrared Explorer (Small Explorer 5)	NASA/ GSFC	Sep-98	full	full
FUSE	Far Ultraviolet Spectroscopic Explorer (FUSE)	NASA/ GSFC	Oct-98	full	full
QuikSCAT	Quick Scatterometer Mission	NASA/ JPL	Nov-98	full	full
M98O	Mars Surveyor '98-Orbiter	NASA/ JPL	Dec-98	full	partial
SWAS (SMEX-3)	Sub-millimeter Wave Astronomy Satellite (Small Explorer 3)	NASA/ GSFC	Jan-99	full	full
Hotbird 4		EUTELS AT	Jan-99	full	not used
M98L	Mars Surveyor '98-Lander	NASA/ JPL	Jan-99	full	partial

## REPORT OF THE MANAGEMENT COUNCIL - MEETING MINUTES

Mission		Lead Agency	Launch Date	CCSDS TLM	CCSDS TC
ABRIXAS	A BRoad-band Imaging X-ray All-sky Survey	DLR-GSOC	Feb-99	full	full
Stardust	Stardust (Discovery Program 4)	NASA/JPL	Feb-99	full	partial
AXAF-1	Advance X-Ray Astrophysics Facility-Imaging (AXAF-I )	NASA/MSFC	May-99	partial	not used
EO-1 (NMP-2)	Earth Orbiter 1 (New Millenium Program 2)	NASA/GSFC	May-99	full	full
CHAMP	CHAllenging Microsatellite Payload	DLR	Jun-99	full	full
ENVISAT-1	Environmental Satellite 1	ESA	Jul-99	full <sup>2</sup>	not used
ADEOS-2	Advanced Earth Observing System 2	NASDA	Aug-99	full	unknown
XMM	X-ray Multimirror Mission	ESA	Aug-99	full	full
Genesis (Discovery 5)	Formerly known as Suess-Urey	NASA	Aug-99	full	full
ARTEMIS	Advanced Relay and Technology Mission Satellite	ESA	Dec-99	full	full
IMAGE (MIDEX-01)	Imager for Magnetopause-to-Aurora Global Exploration (Medium Class Explorer 1)	NASA/GSFC	Jan-00	partial	full
VCL (ESSP-01)	Vegetation Canopy Lidar (Earth System Science Pathfinder 1)	NASA/GSFC	Mar-00	full	full
JASON		CNES	Apr-00	full	full
TIMED	Thermosphere-Ionosphere-Mesosphere Energetics and Dynamics	APL	Apr-00	full	full
STENTOR		CNES	Jun-00	partial	unknown
HESSI (SMEX 6)	High Energy Solar Spectroscopic Imager	NASA/GSFC	Jun-00	full	full
Cluster II		ESA	Jun-00	partial	not used
MAP (MIDEX-02)	Microwave Anistropic Probe (MAP) [Medium Class Explorer (MIDEX) Program]	NASA/GSFC	Nov-00	full	full
EOS PM-1	Earth Observing System PM-1	NASA/GSFC	Dec-00	full	full
GALEX (SMEX 7)	Galaxy Evolution Explorer	NASA/GSFC	2001	full	full
ALOS	Advanced Land Observation Satellite	NASDA	Feb-01	under study	under study
INTEGRAL	International Gamma Ray Astrophysical Laboratory (INTEGRAL)	ESA	Jun-01	full	full

## REPORT OF THE MANAGEMENT COUNCIL - MEETING MINUTES

Mission		Lead Agency	Launch Date	CCSDS TLM	CCSDS TC
EOS LAM-1	Laser Altimetry Mission	NASA/ GSFC	Jul-01	full	full
SIRTF	Space InfraRed Telescope Facility	NASA/ JPL	Dec-01	full	full
ETS-VIII	Engineering Test Satellite VIII	NASDA	Aug-02	under study	under study
EOS CHEM-1	EOS Chemistry Mission	NASA/ GSFC	Dec-02	full	full
ROSETTA		ESA	2003	full	full
METOP 1	Meteorological Operational satellite 1	ESA/ EUMET-SAT	2003	full	full
X-38	ISSA Crew Return Vehicle	NASA	Mar-03	partial	not used
NOAA N and follow-on missions	National Polar-orbiting Operational Environmental Satellite System (NPOESS)	NOAA	Dec-03	full	full
EOS AM-2	Earth Observing System AM-2	NASA/ GSFC	Jun-04	full	full
GLAST	Gamma-Ray Large Area Space Telescope	NASA/ GSFC	Jun-04	under study	under study
EOS PM-2	Earth Observing System PM-2	NASA/ GSFC	Dec-06	full	full
EOS AM-3	Earth Observing System AM-3	NASA/ GSFC	Jun-10	full	full
EOS PM-3	Earth Observing System PM-3	NASA/ GSFC	Dec-12	full	full
ISSA-Columbus	International Space Station Alpha-Manned Laboratory Module	ESA	TBD	under study	under study
ISSA-JEM	International Space Station Alpha-Japanese Experiment Module	NASDA	TBD	full	full
ISSA-AMS	International Space Station Alpha-Alpha Magnetic Spectrometer		TBD	partial	unknown

## NOTES

<sup>1</sup> telecommand is similar, but not fully compliant

<sup>2</sup> packet telemetry for payload data channels but not for housekeeping

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**ATTACHMENT I**  
**BNSC REPORT**

## **BNSC REPORT TO THE CCSDS MANAGEMENT COUNCIL 8/9 JUNE 1998**

The BNSC support to CCSDS has continued at the same level i.e. around 2 staff/years per year covering the work of all three panels and with increased effort on Panel 3. Funding approval from RAL and DERA was renewed recently to run for at least one year to 31 March 1999 and the MOD funding continues.

BNSC work within **Panel 1** has concentrated on contributions to data compression, the Telemetry Green Book, 'light' File Transfer Protocol, security and produced a Green Book on Security in addition to participation in the meetings and RIDs.

Work within **Panel 2** has involved contributions to the Reference Archive Model, the importance of Cost Effectiveness and Data Description in addition to the general work, organisation and inter panel co-operation as Chair of Panel 2. The development of software tools in support of the Panel 2 work has also continued with the development of interfaces to data entities, data description languages and their integration into a test bed at RAL.

Presentations were also made at SpaceOps both in terms of 2 papers and participation in the CCSDS Plenary Session.

Simon Marshall will now provide the Panel 2 support from Logica replacing Christiane Nill.

Work within **Panel 3** has expanded this time with Vega able to take more interest in the SLE services. In addition it is also planned to carry out some prototyping of the SLE services within the UK in conjunction with the STRV programme.

**ACE.** We have been operational at RAL since the start of 1998 receiving data with our 12.5 m S-Band antenna from the NOAA Real Time Solar Wind experiment on the NASA Advanced Composition Explorer (ACE) Satellite. This has meant refurbishing parts of our antenna system and installing a CCSDS compatible decoder supplied by NOAA. We plan to also work the STRV satellites 1a, b, c and d in collaboration with the University of Colorado and the DERA.

**Workshops.** There will be a Digital archiving USA workshop June 15 and 16 at GSFC and BNSC will support this - Peter Allan from RAL. Later we plan two workshops during the next six months. The first will be cosponsored by BNSC, the CEO, ESA and the Remote Sensing Society. It is planned to cover 2 days and is devoted to "Data Access and Archiving". The venue is Edinburgh on the 15 and 16 October 98. The second will be a one day workshop at the Institute of Electrical Engineers in London on November 3 98 and entitled "New Technology New standards". We have also submitted papers for the first ESA TT&C Workshop at ESTEC in June 98

**CIP.** There remains some confusion about the progression of the CEOS Catalogue Interoperability (CIP) to be an ISO standard. Progress of this through Panel 2 is likely to be slow as P2 wish to modify the document to be less Earth Observing specific. Therefore, we seek the Management Council's guidance and ruling on two possible routes 1) Submit to the TSG which would then seek P2 comment on technical content only OR 2) Submit directly to SC13.

**CEOS.** BNSC continues in efforts to nurture ties with CEOS. We have a cross member (W Cudlip) between Panel 2 and the data working group in CEOS and RAL provides the Chairman of the IVOS (Infrared and Visible Optical Sensors) Committee. This is in addition to the CEOS members from BNSC HQ and DERA and the October Workshop detailed above.

P Vaughan 29.5.98

**ATTACHMENT J**  
**CNES REPORT**

**CNES REPORT  
CCSDS MANAGEMENT COUNCIL  
TOKYO. June 1998**

**INTRODUCTION**

- CNES has participated in CCSDS panels 1 A, 1F, 1E, 1J, 2 and 3.
- CNES continues to provide the chairmanship of Panel 3 with M. Winterholer and the chairmanship of ISO/TC 20/ SC 13 with J. Latour .
- CNES maintains its interest for CCSDS activities. But CNES can not continue to support all working subgroup, as noted in CNES Report in November.
- . The main criteria for priority definition will be the applicability of new recommendation to identified project(national or international) .
- The internal resources for CCSDS are equivalent to 4 man-years. Manpower is increasing

**NEW IMPLEMENTATION OF CCSDS RECOMMENDATIONS**

- CNES uses EAST language recommendations for SPOT numerical archiving process.
- CNES has Requested officially for CCSDS Spacecraft Identification Code Assignment for following projects, Stentor (launching June 2000 ), Jason (launching Mars 2000), Corot (Launching End of 2001) CNES has implemented the CCSDS COP-1 protocol within the satellite positioning control center. This first usage was for the SIRIUS 2 satellite positioning (Nov 97).

**CNES SUPPORT TO CCSDS ACTIVITIES**

- CNES has supported the review of following Red Book :

**647.0 R-1** Data entity dictionary Specification language . CNES manages this review .

**912.1-R-1** Space Link Extension Forward CLTU Services  
21 RIDS have been addressed to working group .

- CNES activities into Panels are following:

**Panel 1 A**

CNES continued to support panel 1 A by active participation in working meeting .

CNES has developed a Software tool for turbo code evaluation and simulation

**Panel 1 E**

CNES has actively supported activities of panel 1 E with a new representative (A. Ribes )

**Panel 1 F**

CNES is analysing Potocol X (File Transfer Packet Protocol )

CNES will propose his participation in the process for Protocol X evaluation

**Panel 1 J**

CNES has actively supported the panel P 1 J in May meeting .

CNES will propose a White Book about attitude determination

**Panel 2**

CNES has actively supported all activities of Panel 2 :

- Reviewing of 647.0-R1

- Comments about 650.0-W.2.0 Reference model for an open archival information systems.

Comments about 641-0-B1 Parameter Value Language Specification

CNES performs the French translation for :

- 622 .0-B-1 S F D U Referencing Environnement.

- 644-0-B-1 Language E A S T Specification

**PANEL 3**

CNES continues to support all areas of work in Panel 3 .

CNES participated actively in the process for production of Panel 3 red Books with a lot of difficulties because manpower for Panel 3 is decreasing .

**OTHER SPACE STANDARDISATION ACTIVITIES**

- CNES is working for ECSS (European Cooperation for Space Standardisation ), notably in drafting group E 70 Space Engineering Ground Systems and Operation (in final version )

And for ISO/TC20/ SC 14 /WG 3 in following drafting groups :

- WD 14620 Launch Operations (in Committee Draft )

- WD 14950 Satellite Operability ( in Committee Draft)

- WD 14711 Space System .Mission Operations Concept Checklist (new issue)

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## **ATTACHMENT K**

### **DLR REPORT**

**DLR- GSOC**  
**Status Report to the CCSDS Management Council**  
**NASDA - TOKYO**  
**June 1998**

**1. Introduction**

DLR-GSOC continued its work within the reporting period for CCSDS with the emphasis on its work in panel 3. Additionally, work in the now newly established panel P1J (former P4) will be supported. Effort is now also taken by DLR, to implement CCSDS TM/TC and SLE software to support its future projects.

**2. Panel related report**

**2.1. Panel 1**

DLR contribution for P1 is as follows

- Panel 1A: TM/TC, time, data compression:

DLR continues to stay in a monitoring role. The approach of restructuring the P1 books on the basis of an updated Space-Link Reference Model is supported, although concerns exist made with respect to the additional manpower effort, the possible impact on other panels and on the future credibility of the BB's within the space community. Although, when needed, this action should be done better now than later, it better should be managed in a sensitive way. DLR highly recommends, that a profound analysis is done until the fall CCSDS meetings for final decision then to be taken by the MC.

- Panel 1E: RF/Mod:

DLR attended the meeting in Houston . Since GSOC is planning enhancements in its Weilheim ground station, one of the interesting P1E topics are modulation methods with strategies saving bandwidth as e.g. FQPSK. Also command transmission with higher data rates are of interest for DLR.

DLR will continue its support to the important work of P1E with the manpower allocated.

- Panel 1F:SCPS, X-Protocol:

DLR stays in a monitoring role. This because on the one hand the X-Protocol as well as SCPS on the one hand are not of vital interest for DLR, on the other hand the benefit for future S/C systems and applications is seen in this area.

- Panel 1J, Navigation:

DLR-GSOC in its role as a cross support node is very interested in this work. DLR participated in the Houston P1J meeting. We think, that within this panel the rewriting/modernisation of the BB is an important and also major effort, needing strong interfaces to the work of P2 and P3. A long term work plan is urgently needed and should be supplied latest at the 1998 fall meeting, in order to identify the scope of work and manpower necessary. Concern is raised, that major space organisations,

doing very useful cross support in the day by day process since years, as e.g. India, Russia, South Africa, Brazil, (partly not being CCSDS members) were not present at the Houston meeting; even more: may not know about the P1J effort . The MC should alert these partners and maybe other private ground station service providers now more and more emerging on the market, so they are aware about the P1J effort.

## 2.2. PANEL 2

No activity by DLR. Nevertheless DLR asks the P2 chair to leave DLR personnel as is on the mailing and distribution list, since DLR wants to be further informed of the work progress, especially in the area of Control Authorities and archives.

## 2.3. PANEL 3

DLR is active in supporting the work in P3 and will stay within the present manpower figures. DLR chairs the working groups WG2/3 SLE return and forward link services. The following activity, among others, was supported at the Houston meeting:

- Review RID's of the CLTU book
- Review WB's
- grouping of documents

The services and the ideas behind the existing work within P3 have to be proven now by real implementations. This will bring up further questions, which are started to discuss in P3 already now. One of these questions is the operational aspect the other the communication layer. With establishing new working groups inside P3 for these items the discussions on these topics should get the necessary weight. Therefore DLR is supporting these new WGs.

Beside the now defined work within P3 DLR will investigate into further necessary services, not yet defined by P3, which will be necessary in today's space operations.

## 2.4. TSG

DLR, not being in an active role in many sub-panels or working groups of CCSDS, does see a benefit of being active within the work of TSG. Additionally, TSG is an information forum for monitoring the status and tendency of the technical work within the different panels, worth while to be attended especially by smaller agencies, not being able to attend the different panel meetings. TSG charter should be changed in that sense.

The Houston TSG meeting, the first big TSG meeting separated from MC, proofed the usefulness of such an effort. TSG there also could show, that proposed future work items can be delegated to inter panel working groups for analysis of the problem, in order to develop a basis for further decision taking by the TSG or MC. This showed, that TSG is now more and more in a role of a technical working an steering entity, DLR was asking for many times in the past.

## 2.5. Management Council

DLR will stay in its role at the MC as a member agency. DLR apologises not to be able to attend the Tokyo meeting due to budgetary and timing reasons. This report therefore is submitted offline to the MC.

### 3. DLR-GSOC CCSDS IMPLEMENTATIONS

DLR is on the way to and has already partly implemented software in the area of P1-TM/TC for the following missions:

Project	Launch	Uplink			Downlink		
		Packets	Frames	Code	Packets	Frame	Code
EUTELSAT	6/98	Y	Y	Y	N	Y	Y**
ABRIXAS	8/98	Y	Y	Y	Y*	Y***	Y**
CHAMP	7/99	Y	Y	Y	Y*	Y	Y**
BIRD	7/99	.....			****	.....	
GRACE	t.b.d.	.....			****	.....	

\* : no segmentation

\*\* : no R-S coding

\*\*\* : no 1<sup>st</sup> header pointer for VC-dump

\*\*\*\*: extent under definition

As one can see, EUTELSAT W1 will be the first user of CCSDS TM/TC software at its control centre mid this year.

Also, P3-SLE related software is under development, to be implemented in 3 phases with the following strategy:

- Realisation of a complete new and independent SLE service environment
- Two phase integration into existing control centre services and functions
- Provision of interfaces to external agencies and experimenters

Hubertus Wanke  
CCSDS Representative  
DLR- GSOC

**ATTACHMENT L**  
**ESA REPORT**

**ESA Report to Management Council at NASDA, Tokyo,**  
**8/9 June 1998**

1. Introduction

ESA's support to CCSDS remained practically on the same level as before; only towards the end of the report period some restrictions were unavoidable - mainly due to the current shortage of mission funds.

ESA supported the activities of the MC, TSG and of all technical panels, emphasising again Panel 3 work.

In addition ESA supplied the chairperson for TSG, Panel 1 and Subpanel 1E. Study activities (executed by industry) in direct support of technical work of Panels and in preparation of planned future work continued.

2. Support of Technical Panels

Panel 1 A: Particular effort was spent on the drafting of the Turbo Code Recommendation (pink sheets), the new issue of the Telecommand GB and the review of the Packet Telecommand Standards. For work on "Lossy Data Compression" the ESAS work force was strengthened by one additional delegate from ESTEC.

Panel 1 E: ESA's contribution to panel work continued on the standard level. Particular effort was spent on the recommendations for "bandwidth efficient modulation schemes for near-earth and deep-space mission" and "medium rate telecommand".

Panel 1 F: ESA contributed actively to the current main activity of this panel - the "protocol X (File Delivery Protocol)" recommendation by drafting the "Core Protocol" specification.

Panel 1 J: Activities of this subpanel have just started and ESA is supporting it by supplying one delegate.

Panel 2: ESA support to this panel continued, but on a slightly lower level than before - due to manpower resource constraints. The effort of EAS delegates concentrated mainly on the revision of the P2 Management Plan, provision of secretarial support in several areas, report on "Control Authority" activities (CAOS, Phase 4) and

the customisation for XMM, review of the latest WB on "Open Archival Information System", as well as on 5 year reviews of existing Blue Books.

Panel 3: ESA hosted two working group meetings at ESOC (end of January and end of March) and supported the mid-March working group meeting at JPL, as well as the P3 Workshop in Houston (but the latter with reduced on-site presence). ESA delegates participated very actively in the specification of the new Red Books on SLE services and have taken over the drafting work on the White Books for six further SLE service specifications. ESA delegates are also involved in two newly formed Panel 3 working groups.

3. CCSDS Related Study Activities

No new studies were placed during the report period, but all ten previously placed studies continue.

4. Implementation of CCSDS Recommendations

The deployment of Packet Telemetry and Telecommand Equipment at ESA LEOP stations (Kourou, Perth, Villafranca) is now proceeding on schedule.

After availability of relevant Panel 3 Red Books and following discussions with NASA (HQ and JPL) the preparations for SLE implementations for support of the Integral mission are proceeding on ESA's side: the tender action for selection of the implementation contractor was initiated.

5. Available CCSDS Manpower Resources

During the report period there were no reductions in the total resource level for ESA's CCSDS activities: ca. 30 mm per annum, supplied by 14-16 individuals (permanent staff). However, due to the significant reductions in staff level of the TOS directorate, which occurred during the last year and is expected to still continue beyond the end of 1998, it will probably not be possible for ESA to maintain the current CCSDS resource level. ESA is considering to compensate possible future reductions in the current CCSDS work force by employment of contract staff in this area.

However, another reason for concern is the current (reduced) level of mission funds. This already caused restrictions concerning the number of ESA participants in the Houston meetings and in the MC meeting in Tokyo. It is likely that the D/TOS mission budget for 1999 will again be very tight. ESA is therefore recommending to the MC to Look for measures on how to reduce the travel needs in the production of CCSDS recommendations. This applies in particular to Panel 3 work and the related rather high number of WG meetings.

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**ATTACHMENT M**

**NASA REPORT**

**NASA Report  
to the  
CCSDS Management Council**

**Tokyo, Japan  
08 June 1998**

**Adrian J. Hooke  
NASA Jet Propulsion Laboratory  
Manager, NASA Space Mission Operations Standards Program**

**Management Changes**

At NASA Headquarters, *Mr. Joseph Rothenberg* has replaced Mr. Wilbur Trafton as the Associate Administrator of NASA's Office of Space Flight; Mr. Rothenberg was previously the Director of the Goddard Space Flight Center and is considered knowledgeable about and supportive of the CCSDS standardization work. Prior to his tenure as Director of GSFC, Mr. Rothenberg was assigned to essential positions in missions operations and project management, including the Hubbell Space Telescope. *Mr. William Readdy* will replace Mr. Steve Oswald as the Deputy Associate Administrator (Operations) this summer; he is an astronaut, as was Mr. Oswald. Early indications are that he is a manager who depends on his staff for input to the decision making process. *Mr. Bob Spearing* has returned to NASA from private industry and has replaced Mr. Dave Harris as the Deputy Associate Administrator (Space Communications). He will also chair a new "Board of Directors" for the NASA Space Operations Management Office. His position will be moved under the Deputy Associate Administrator (Operations) when the new organizational structure is implemented this summer. Mr. Spearing is a former missions operations and data systems manager at GSFC and is very knowledgeable and supportive of the CCSDS activities. We believe he will be a strong proponent of maintaining and possible expanding the current level of CCSDS work.

At Johnson Space Center, Mr. John O'Neill has retired and Mr. Stan Newberry has replaced him in an Acting capacity as the Director of the Space Operations Management Office (SOMO). The NASA Space Mission Operations Standards Program reports directly to SOMO.

At the Jet Propulsion Laboratory, *Mr. Gael Squibb* was appointed last summer to be the Director of Telecommunications and Mission Operations. He is a staunch supporter of standardization and has already demonstrated a strong willingness to move the Deep Space Network and its control center facilities towards a new era of standardized services. Mr. Adrian Hooke resides on Mr. Squibb's staff where he manages the NASA Space Mission Operations Standards Program in support of CCSDS.

**Budget**

As reported at the last meeting, the NASA standardization budget for the U.S. Fiscal Year 1998 (October 1997 through September 1998) received an 18% increase relative to past years, to an annual level of approximately \$4.5 million. Accordingly, NASA was able to increase its

commitment to Panel-3 by over 300%, which has been reflected in the recent explosion of products from the Panel.

The current level of resources translates into approximately 2.5 full time equivalent NASA Civil Service employees and 16 full time equivalent Contractors. Budget negotiations for FY99 (starting in October 1998) are currently underway. In the current Fiscal environment it is going to be extremely difficult for NASA to sustain the growth that was realized this year, so some modest realignment of NASA's work priorities may be necessary during the coming work period. It does appear, though, that NASA will continue to support the SuperMOCA activity as a pre-standardization R&D activity.

### **Mission Compatibility Assessment**

Mr. Tom Gannett of NASA began assembling a critical database of missions that are using CCSDS Recommendations. The preliminary results of the analysis - which provide overwhelming evidence of the widespread acceptance of our work - are attached..

### **Data Archive Symposium**

At the Fall 1997 Panel 2 workshop in Frascati, it was agreed that one or more workshops should be held to assess requirements for additional archival standards for digital information. NASA agreed to host such a workshop and to solicit broad participation in order to get the best perspective on what is already being done and what is most desired. The Digital Archive Directions (DADs) workshop is scheduled for June 22-26 at the US National Archives and Records Administration facility in College Park, Maryland. In addition to CCSDS, this workshop is being sponsored by:

- o International Organization for Standardization (ISO)
- o Committee on Earth Observation Satellites (CEOS)
- o The Johns Hopkins University - Applied Physics Laboratory (APL)
- o National Aeronautics and Space Administration (NASA)
- o National Archives and Records Administration (NARA)
- o Research Libraries Group (RLG)

### **Science Information Services**

In an effort to reduce costs, NASA has formed a Science Information Services (SIS) study team that is chartered to make recommendations on cost-effective practices. The team is composed of representatives from the science disciplines and is lead by a representative from the NASA SOMO organization. The scope of the study looks at information from receipt of clean instrument data (e.g., packets) to access via archives; it is not addressing science analysis. Standards are recognized as being important, but the primary focus is on discipline standards. Current work involves assessing archives using a survey based on the CCSDS draft archive reference model, and the preparation of a final report to management.



## Planned Use of CCSDS Space Link Extension Services (Recommendations Currently under Development)

<b>ERS-1</b> (ESA, Jul-91)	<b>ARIANE 5</b> (CNES, Various)	<b>Landsat-7</b> (NASA/GSFC, Jul-98)	<b>ENVISAT-1</b> (ESA, Jul-99)	<b>Intenational Space Station (ISS)</b> (Multinational, Various)
<b>SAMPEX (SMEX-1)</b> (NASA/GSFC, Jul-92)	<b>ACE</b> (NASA/GSFC, Aug-97)	<b>Meteor-3M/ SAGE III</b> (RSA/NASA, Aug-98)	<b>ADEOS-2</b> (NASDA, Aug- 99)	<b>ISS-Columbus</b> (ESA, TBD)
<b>EURECA</b> (ESA, Jul-92)	<b>Hotbird-3</b> (EUTELSAT, Sep-97)	<b>OERSTED</b> (DSRI, Aug-98)	<b>XMM</b> (ESA, Aug-99)	<b>ISS-JEM</b> (NASDA, TBD)
<b>Spacelab- Deutsche 2</b> (DLR, Apr-93)	<b>Cassini</b> (NASA/JPL, Oct- 97)	<b>WIRE (SMEX-5)</b> (NASA/GSFC, Sep-98)	<b>Genesis (Discovery 5)</b> (NASA, Aug-99)	<b>ISS-AMS</b> (Multinational, TBD)
<b>STRV-1 A/B</b> (DERA, Jun-94)	<b>TEAMSAT</b> (ESA, Oct-97)	<b>FUSE</b> (NASA/GSFC, Oct-98)	<b>ARTEMIS</b> (ESA, Dec-99)	<b>EOS LAM-1</b> (NASA/GSFC, Jul-01)
<b>MIR 18 and follow-on missions</b> (RSA/NASA, Feb-95—)	<b>YES</b> (ESA, Oct-97)	<b>QuikSCAT</b> (NASA/JPL, Nov-98)	<b>IMAGE (MIDEX-01)</b> (NASA/GSFC, Jan-00)	<b>SIRTF</b> (NASA/JPL, Dec- 01)
<b>ERS-2</b> (ESA, Apr-95)	<b>ETS-VII</b> (NASDA, Nov- 97)	<b>Mars 98 Orbiter</b> (NASA/JPL, Dec- 98)	<b>VCL (ESSP-01)</b> (NASA/GSFC, Mar-00)	<b>ETS-VIII</b> (NASDA, Aug- 02)
<b>ISO</b> (ESA, Nov-95)	<b>TRMM</b> (NASDA, Nov- 97)	<b>SWAS (SMEX- 3)</b> (NASA/GSFC, Jan-99)	<b>JASON</b> (CNES, Apr-00)	<b>EOS CHEM-1</b> (NASA/GSFC, Dec-02)
<b>Radarsat</b> (CSA, Nov-95)	<b>EUTELSAT-F1</b> (EUTELSAT, Jan-98)	<b>Hotbird 4</b> (EUTELSAT, Jan-99)	<b>TIMED</b> (APL, Apr-00)	<b>ROSETTA</b> (ESA, 2003)
<b>SOHO</b> (ESA, Dec-95)	<b>Lunar Prospector</b> (NASA/ARC, Jan-98)	<b>Mars 98 Lander</b> (NASA/JPL, Jan- 99)	<b>STENTOR</b> (CNES, Jun-00)	<b>METOP 1</b> (ESA/EUMET- SAT, 2003)
<b>Rossi XTE</b> (NASA/GSFC, Dec-95)	<b>SNOE</b> (U of Col. LASP, Jan-98)	<b>ABRIXAS</b> (DLR-GSOC, Feb-99)	<b>HESSI (SMEX 6)</b> (NASA/GSFC, Jun-00)	<b>X-38</b> (NASA, Mar-03)
<b>NEAR</b> (APL, Feb-96)	<b>TRACE (SMEX- 4)</b> (NASA/GSFC, Mar-98)	<b>Stardust</b> (NASA/JPL, Feb- 99)	<b>Cluster II</b> (ESA, Jun-00)	<b>NOAA N and follow-on missions</b> (NOAA, Dec- 03—)
<b>BeppoSAX</b> (ASI, Apr-96)	<b>EOS AM-1</b> (NASA/GSFC, Jun-98)	<b>AXAF-1</b> (NASA/MSFC, May-99)	<b>MAP (MIDEX- 02)</b> (NASA/GSFC, Nov-00)	<b>EOS AM-2</b> (NASA/GSFC, Jun-04)
<b>Cluster</b> (ESA, Jun-96)	<b>STRV-1 C/D</b> (DERA, Jun-98)	<b>EO-1 (NMP-2)</b> (NASA/GSFC, May-99)	<b>EOS PM-1</b> (NASA/GSFC, Dec-00)	<b>GLAST</b> (NASA/GSFC, Jun-04)
<b>TOMS EP-1</b> (NASA/GSFC, Jul-96)	<b>CATSAT (STEDI 3)</b> (U of NH, Jul-98)	<b>CHAMP</b> (DLR, Jun-99)	<b>GALEX (SMEX 7)</b> (NASA/GSFC, 2001)	<b>EOS PM-2</b> (NASA/GSFC, Dec-06)
<b>FAST (SMEX-2)</b> (NASA/GSFC, Aug-96)	<b>DS-1 (NMP)</b> (NASA/JPL, Jul- 98)		<b>ALOS</b> (NASDA, Feb- 01)	<b>EOS AM-3</b> (NASA/GSFC, Jun-10)
<b>MGS</b> (NASA/JPL, Nov-96)			<b>INTEGRAL</b> (ESA, Jun-01)	<b>EOS PM-3</b> (NASA/GSFC, Dec-12)
<b>MPF</b> (NASA/JPL, Dec- 96)				



## Planned Use of CCSDS Space Link Extension Services (Recommendations Currently under Development)

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<u>Mission</u>	<u>Launch</u>	<u>Lead Agency</u>
<b>ABRIXAS</b>	Feb-99	DLR
<b>CHAMP</b>	Jun-99	DLR
<b>Cluster II</b>	Jun-00	ESA
<b>INTEGRAL</b>	Jun-01	ESA
<b>ROSETTA</b>	2003	ESA

† **Space Link Extension (SLE) Services**  
extend the CCSDS link layer protocols  
between ground data systems for cross  
support among CCSDS Agencies.



## CCSDS Standard Formatted Data Units (SFDUs): Examples of Use for Mission Data Archiving

---

<b>ACE</b>	<b>Geotail</b>	<b>PHOBOS 2</b>
<b>AXAF-I</b>	<b>IMAGE (MIDEX-01)</b>	<b>Polar</b>
<b>Cassini/Huygens</b>	<b>IMP 8</b>	<b>Rossi XTE</b>
<b>Clementine</b>	<b>Interball</b>	<b>SAMPEX</b>
<b>Cluster II</b>	<b>IRAS</b>	<b>SOHO</b>
<b>ENVISAT-1</b>	<b>ISIS</b>	<b>TOPEX/Poseidon</b>
<b>EO-1 (NMP-2)</b>	<b>Magellan</b>	<b>TRACE</b>
<b>ERS-1</b>	<b>Mariner</b>	<b>TRMM</b>
<b>ERS-2</b>	<b>MAP (MIDEX-02)</b>	<b>UARS</b>
<b>FAST</b>	<b>Mars Global Surveyor</b>	<b>Ulysses</b>
<b>FUSE</b>	<b>Mars Pathfinder</b>	<b>Viking 1 &amp; 2</b>
<b>Galileo</b>	<b>Mars Surveyor-Lander 98</b>	<b>Voyager 1 &amp; 2</b>
<b>GOES (multiple)</b>	<b>Mars Surveyor-Orbiter 98</b>	<b>WIND</b>



## Missions Using CCSDS Lossless Data compression (Recommendation 121.0-B-1, May 1997)

<u>Mission</u>	<u>Launch</u>	<u>Lead Agency</u>	<u>Implementation</u>
Mars Observer	Sep-92 <sup>†</sup>	NASA/JPL	HW
SERTS-96 (Sounding Rocket)	Nov-96	NASA/GSFC	HW
Mars 96	Nov-96 <sup>†</sup>	RSA	?
Lewis (SSTI)	Aug-97 <sup>†</sup>	NASA	HW
Cassini/Huygens Cosmic Dust Analyzer (CDA ) Instrument	Oct-97	NASA/JPL	SW (uploaded after launch)
SERTS-97 (Sounding Rocket)	Nov-97	NASA/GSFC	HW
SWAS (SMEX-3)	Jan-99	NASA/GSFC	SW
EO-1 (NMP-2)	May-99	NASA/GSFC	?
KOMPSAT-1	1999	KARI	HW
VCL (ESSP-01)	Mar-00	NASA/GSFC	HW
MAP (MIDEX-02)	Nov-00	NASA/GSFC	SW
EOS LAM-1	Jul-01	NASA/GSFC	?
SIRTF	Dec-01	NASA/JPL	?
ROSETTA	Jan-03	ESA	HW
COBRA	1997	U.S. Dept. of Energy	HW
Space-Based Infrared System (SBIRS)	?	U.S. Dept. of Defense	HW
Standard Missiles	Various	U.S. Dept. of Defense	HW

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**ATTACHMENT N**  
**NASDA REPORT**

## **NASDA STATUS REPORT**

**CCSDS MC (Tokyo JAPAN, June 8-9, 1998)**



**NASDA CCSDS Activity Report after the last MC meeting.**

### **1. Implementation of the Recommendation**

#### **1) ONBOARD**

- **ETS - VII ( Rendezvous docking, Launched in Nov. 1997)**  
Uplink - Telecommand / Downlink - AOS  
Now we have receive AOS telemetry and transmitted telecommand normally on orbit.
- **TRMM (Precipitation Radar, Launched in Nov. 1997 ON orbit)**  
Uplink - Telecommand / Downlink - AOS
- **ADEOS -II (Earth Observation Satellite, Launch in Aug. 1999)**  
Downlink - AOS
- **JEM (Space Station, Launch in 2001)**  
Uplink - AOS / Downlink - AOS
- **HTV (H-2 Transfer vehicle, Launch in Aug. 2002)**  
Uplink - Telecommand / Downlink - AOS

## **NASDA STATUS REPORT**

**CCSDS MC (Tokyo JAPAN, June 8-9, 1998)**



- **ETS - VIII (Engineering Test Satellite, Launch in Aug. 2002)**  
**Uplink - Telecommand / Downlink - AOS**
- **ALOS (Land Observation Satellite, Launch in Feb. 2003)**  
**Uplink - Telecommand / Downlink - AOS**
- **SELENE(Selenological & Eng. Explorer, Launch in 2003)**  
**Uplink - Telecommand / Downlink - AOS**

### **2) GROUND System**

- **Currently EPAP is processing AOS Tlm and telecommand through TDRSS replacing COMETS. Because of COMETS Injection failure to geostationary orbit.**
- **CCSDS packet data processing equipment is now designed and developed for JEM. This equipment is installed in the DRTS (Data relay test satellite) BBE of space tracking network.**
- **As the next generation ground tracking network system, we start the design phase of ground station supporting CCSDS recommendation.**

## **NASDA STATUS REPORT**

**CCSDS MC (Tokyo JAPAN, June 8-9, 1998)**



### **2. PANEL ACTIVITIES**

#### **Panel 1.**

- Continuing support P1a, 1f 1j.
- Review and analysis of Protocol-X.

#### **Panel 2.**

- Supporting P2 activities.

#### **Panel 3.**

- Continuing support all area P3.
- NASDA will study for cross support to adopt the CCSDS recommendation.

### **3. NASDA Standards for CCSDS**

- NASDA maintains NASDA standard for Telecommand and AOS.
- Study of revising NASDA TTC Standard including of CCSDS RF&MOD.

## **NASDA STATUS REPORT**

**CCSDS MC (Tokyo JAPAN, June 8-9, 1998)**



### **4. Organization and Manpower**

**NASDA CCSDS members as follows.**

<b>Delegate</b>	<b>Tsukasa Mito</b>
<b>TSG/MC/ISO</b>	<b>M. Kashimoto S. Ogawa</b>
<b>Panel 1</b>	<b>S. Ogawa (P1a) Y. Nonaka (P1e, P1f) M. Sawabe (P1j)</b>
<b>Panel 2</b>	<b>Y. Inoue</b>
<b>Panel 3</b>	<b>K. Shinohara D. Asoh</b>
<b>Secretariat</b>	<b>Y. Nonaka</b>

**Total manpower has kept 2 persons / year.**

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**ATTACHMENT O**  
**ISAS REPORT**

**ISAS REPORT TO CCSDS MANAGEMENT COUNCIL****NASDA, Japan, June 8-9, 1998****Takahiro Yamada****1. IMPLEMENTATION OF CCSDS RECOMMENDATIONS****1.1 ONBOARD**

Spacecraft	Mission	Launch Year	TLM Pkt	TLM Frm	TLM Code	TC Pkt	TC Frm	TC Code
PLANET-B	Mars Orbiter	1998		✓	✓			
LUNAR-A	Lunar Penetrators	1999		✓	✓			
ASTRO-E	X-ray Telescope	2000	✓	✓	✓			
MUSES-C	Asteroid Sample Return	2002	✓	✓	✓	✓	✓	✓
ASTRO-F	Infrared Telescope	2003	✓	✓	✓	✓	✓	✓
SOLAR-B	Solar Observatory	2004	✓	✓	✓	✓	✓	✓

**1.2 GROUND**

Complex	Function	TLM Pkt	TLM Frm	TLM Code	TC Pkt	TC Frm	TC Code
SSOC	Spacecraft Control Center	U	O	-	U	U	U
KSC	Ground Station (Near Earth)	U	O	O	U	U	-
UDSC	Ground Station (Deep Space)	U	O	O	U	U	-

O: Operational

U: Under development

ISAS plans to use SLE services for data transfer between ISAS and JPL for MUSES-C (probably RAF and CLTU services). SLE services will be supported by a gateway at SSOC (Sagamihara Space Operations Center) of ISAS.

## **2. PANEL ACTIVITIES (From October 1996 to May 1998)**

### **2.1 PANEL 1**

ISAS supported most activities of Subpanels 1A and 1B.

ISAS is editing the following Draft White Books:

- Space Data Link Protocol, Synchronous 1 (Conventional TM Frames),
- Space Data Link Protocol, Synchronous 2 (AOS Frames),
- Space Data Link Protocol, Asynchronous 1 (TC Frames),
- Space Packet Protocol,
- Space Link Reference Model.

ISAS reviewed the following documents and submitted RIDs and comments:

- Telecommand Draft Green Book,
- Telemetry Draft Green Book,
- Security Draft Green Book,
- SCPS Red Books and Draft Green Book,
- Protocol-X concept papers and Draft White/Green Books.

### **2.2 PANEL 3**

ISAS supported activities of Working Group 1, and hopes to support Working Group 4 in the near future.

ISAS reviewed the following documents and submitted RIDs and comments:

- SLE Forward CLTU Service Red Book,
- SLE Service Management White Book.

## **3. STUDY ACTIVITIES**

ISAS is performing study activities related to CCSDS in the following areas:

- Space link Addressing,
- Space link management/control,
- High performance file transfer protocol.

## **4. AVAILABLE MANPOWER RESOURCES**

Only one person is available at ISAS for supporting CCSDS activities, and he does this work on a part-time basis. The manpower available to support CCSDS in this year (1998) is 1/3 man-year

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**ATTACHMENT P**  
**NPSO REPORT**

NSPO Report to Management Council at NASDA, Tokyo  
June 8/9, 1998

1. Introduction

NSPO is a new comer to the space community. When it was established back in 1992, it started from scratch. ROCSAT-1 is its first small scientific satellite and the program began in 1993. The project is near its completion and its launch date has been set for launch in December of this year. It carries three payloads, consisting of Ocean Color Imager, Ionospheric Plasma & Electrodynamics Instrument and the Experimental Communication Payload.

For the moment, NSPO can not make any significant contribution to CCSDS technical activities because of lack of senior engineers.

2. Implementation of CCSDS Recommendations

While NSPO is not actively involved in participating in CCSDS technical activities, NSPO has nevertheless followed the CCSDS recommendations. In establishing its Ground Segment architecture, it has adopted the CCSDS standard of Packet Telemetry and Telecommand for its ground stations. In addition, its ROCSAT-1 C&DH has followed the CCSDS standard.

NSPO currently is undertaking the planning for next two space missions, i.e., ROCSAT-2 and -3. ROCSAT-2 will be a remote sensing satellite and ROCSAT-3 will be weather oriented mission. Because of its extreme high data rate, ROCSAT-2 will take advantage of compression schemes. The CCSDS Lossless data compression recommendation will be utilized for its scientific data.

**ATTACHMENT Q**

**PANEL 1 REPORT**

**REPORT OF  
CCSDS PANEL 1 MEETING NO 20  
IN HOUSTON  
12. MAY 1998**

Issue 1.0, Date 14 June 1998

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**APPROVED BY KLAUS LENHART, CHAIRMAN OF CCSDS PANEL 1.**

## INTRODUCTION

This report contains the proceedings of the 20th Panel 1 meeting.

The meeting took place in the afternoon of 12. May 1998.

The report contains:

- the agenda as approved by the meeting
  - the proceedings of the panel meeting
  - the disposition of the panel-level actions including new action items
  - the resolutions
- and
- an annex with the presentations given by the Panel and Sub-Panel Chairmen and other members of the panel during the meeting.

The chairman of Panel 1 takes this opportunity to thank the agencies and their engineers for the support of the Panel's activities since the last meeting in May 1997 and during this meeting.

## PARTICIPANTS

The following persons attended the Panel 1 meeting:

Klaus Lenhart (Chairman)	Jean Pierre Rocher	Manfred Drexler
Merv MacMedan	Horst Kummer	Jim Pritchard
Adrian Hooke	Takahiro Yamada	David Townley
Stephen Fisher	Shinji Ogawa	Robert Stephens
Gian Paolo Calzolari	Felipe Flores-Amaya	
J.D.Andean	Howard Weiss	
Zhai Zheng'an	Xuclong Xu	
Fred Brosi	Jin Liu	
Jean-Luc Gerner	Jacques Foliard	
Warner Miller	Gilles Moury	

## AGENDA

The following text provides the final agenda of the meeting.

- 1 Approval of Agenda
- 2 Approval of Minutes
- 3 Reports of Panel and Sub-Panel Chairmen (K.G. Lenhart, M.L. MacMedan, J.L.Gerner, A.J. Hooke, F. Floris-Amaya); Concise presentations was suggested. However, detailed reporting was requested on inter-sub-panel issues. Planning issues shall be postponed to point 5 of the agenda.
- 4 Review of open Actions
  - A-P-96-1: The Sub-Panel Chairmen to conduct an exchange of views on the redefinition of the responsibilities of the sub-panels and to report back at the next meeting.
  - A-P-96-4: The Sub-Panel Chairmen to review the Draft Green Book on Testing by September 97.
  - A-P-97-1: The Panel Chairman to submit panel resolutions to MC
  - A-P-97-2: The Panel Chairman to put Testing Green Book on Bongo.

- A-P-97-3: The Panel Chairman to submit the following issues to TSG and MC respectively:
  - Text for proposed MC resolution on release of software related to CCSDS Recommendations
  - Establishing of Working Servers for Application Notes
  - New Work Items (see table in the Chairman's report to TSG/MC)
  - renaming of Panel into "Space Communication Panel"
  - future role of TSG
  - Change of P1E Chairmanship
  - Turbo Code patent issue.
- A-P-97-4: The Chairman of P1J to submit by Sept. 97 to the P1 Chairman:
  - a draft charter for P1J
  - the minutes of the P1J Oberpfaffenhofen meeting
  - a plan of work for P1J
  - the name of a Deputy Chairman for P1J.

5 Panel 1 Activity Planning - "Roadmap to Future"; the subject shall be discussed following the decisions of the TSG.

6 Restructuring of P1 Documents

7 Approval of Resolutions

8 Schedule of Panel and Sub-Panel meetings.

9 A.o.B.

## 1 APPROVAL OF AGENDA

The agenda was approved as recorded above.

## 2 APPROVAL OF MINUTES

The minutes of the Panel 1 Meeting No 19 in Silver Spring, May 1997, were approved.

## 3 REPORTS OF PANEL AND SUB-PANEL CHAIRMEN REPORTS OF PANEL AND SUB-PANEL CHAIRMEN

### 3.1 Panel 1 Report

K.G.Lenhart presented the progress report concerning panel level activities (see annex). There was a discussion on the following specific issues:

- Attendance of experts in technical meetings: the chairman expressed his concern about adequate technical support for approved panel activities. This applies in particular to the regular attendance of specific experts.
- New work items: after extensive discussion and in line with the CCSDS Procedures Manual it was reiterated that the following rules apply:
  - work items up to WB status generated by the panel and covered by the plan of work will be approved by the panel
  - work items generated outside the panel and items going beyond WB status require the approval of the TSG and the MC.
- Application Notes: the P1 Chairman will investigate the establishing of a server for P1 application notes. He will inform the Sub-Panel Chairmen on the progress.

### 3.2 Report of Sub-Panel 1A Chairman

M. MacMedan presented the P1A progress achieved since last meeting and the progress achieved during the joint P1A/P1E meeting May 8<sup>th</sup> (see annex). Further, the plan of work for the P1A meeting on 13. - 15. May was presented. The proposed resolutions were discussed and approved (see annex).

P1A proposes:

- \_ that the time code format change request for negative years be assigned to P2
- that the time correlation service be assigned to P3 as new work item
- and that for the standardisation of on-board data system interfaces, networking and time distribution probably a new panel should be established.

These three subjects should be discussion points at the next TSG meeting.

### 3.3 Report of Sub-Panel 1E Chairman

J.-L. Gerner presented the status of P1E work (see annex). Of particular concern is the situation with the congested S-band which may have to be allocated to mobiles at a coming WRC. Therefore the development of bandwidth-efficient modulation techniques is very important. Also radio relay communications requires special attention. The Resolutions were approved (see annex).

### 3.4 Report of Sub-Panel 1F Chairman

A. Hooke presented the contents and status of P1F work (see annex). The SCPS RB Phase 3 are under ISO review. Results are expected early 1999. The new file delivery protocol (Protocol-X) is progressing well. A draft GB is available. The first RB version will be released early August 98 with the aim to get to BB status about one year later, after extensive laboratory prototype testing. He suggested that future BBs should be accompanied by working software implementations. P1F proposed a Resolution for the new protocol to seek permission from the MC to publish an Issue-1 RB. This was approved.

### 3.5 Report of Sub-Panel 1J Chairman

Mr. Flores-Amaya presented the work plan of P1J (see annex). In addition to updating and enhancing the current BB three new areas are taken into account: attitude, antenna pointing, global satellite-based navigation systems. A WB is planned to be released within 12 months.

## 4 REVIEW OF OPEN PANEL ACTIONS

- A-P-96-1: The Sub-Panel Chairmen to conduct an exchange of views on the redefinition of the responsibilities of the sub-panels and to report back at the next meeting. (continued)
- A-P-96-4: The Sub-Panel Chairmen to review the Draft Green Book on Testing by September 97. (continued)
- A-P-97-1: The Panel Chairman to submit panel resolutions to MC (completed)
- A-P-97-2: The Panel Chairman to put Testing Green Book on Bongo. (continued)
- A-P-97-3: The Panel Chairman to submit the following issues to TSG and MC respectively:
  - Text for proposed MC resolution on release of software related to CCSDS Recommendations
  - Establishing of Working Servers for Application Notes
  - New Work Items (see table in the Chairman's report to TSG/MC)
  - Renaming of Panel into "Space Communication Panel"
  - Future role of TSG

- Change of P1E Chairmanship
  - Turbo Code patents issue
- This has all been completed.
- A-P-97-4: The Chairman of P1J to submit by Sept. 97 to the P1 Chairman
    - a draft charter for P1J
    - the minutes of the P1J Oberpfaffenhofen meeting (not available)
    - a plan of work for P1J
    - the name of a Deputy Chairman for P1J. (obsolete)
- This was all completed during TSG 14.

## 5 PANEL 1 ACTIVITY PLANNING - "ROADMAP TO FUTURE"

The subject was discussed following the decisions of the TSG. By fall this year a dedicated working group (established by the recent TSG meeting) will have defined a CCSDS strategic plan or "Roadmap to the Future". This work plan will take into account inputs to be received from the agencies with respect to drivers and needs. This shall also include scenarios likely to exist in the considered time frame. (Beyond 2000). The existing panel 1 work plan will have to be integrated and for the higher level roadmap adapted. Priorities may have to be established following the acceptance of a new Roadmap to the Future. Sub-Panel chairmen are asked to contribute to this activity. The currently valid workplan is attached in the panel 1 chairman report and in the Sub-Panel reports (see annex).

## 6 RESTRUCTURING OF P1 DOCUMENTS

Mr. Yamada gave a short introduction to the new Link Layer Architecture (see annex). On the basis of that proposals were made how to restructure the existing panel recommendations. The main aim being to improve the overall consistency of the recommendations within themselves (nomenclature mainly) and with the OSI layering approach. Within the proposal was a plan to prepare by next meeting updated draft Blue Books, which will follow the new structure. This proposal was accepted after some discussion, during which concerns as to the stability and contractual implications were raised. The chairman proposed to give the activity a go ahead and when the new books will be available, the final decision will be taken. This will also apply to the consequent restructuring of the panel work for the Sub-Panels. This applies mainly to Sub-Panels 1A and 1F. They will have to be renamed appropriately.

## 7 APPROVAL OF RESOLUTIONS

The resolutions put forward by the Sub-Panels A, E and F were approved and requested by the Panel 1 Plenary to be presented to the MC and the TSG respectively for discussion/decision/approval. These resolutions are listed in Chapter 11.

## 8 SCHEDULE OF PANEL AND SUB-PANEL MEETINGS

The following coordinated meeting schedule was arrived at during the TSG meeting:

- P1F: Oct. 14. - 16. 98 in Toulouse
- P1A: Oct. 19. - 21. 98 in Darmstadt
- (- ISO: Oct. 19. - 22. 98 in Vienna)
- Road Map WG: Oct. 20. - 22. 98 in Austria
- P2: Oct. 26. - 30. 98 in Europe

- P3: Oct. 26. - 30. 98 in Darmstadt
- P1J: Oct. 26. - 30. 98 Darmstadt (tbc)
- TSG/MC/ISO-SC13: Nov. 4.- 6. 98 in Darmstadt

Small working group meetings for urgent P1E items will be scheduled separately.

## 9 ANY OTHER BUSINESS

No other business has been brought up.

## 10 SUMMARY OF PANEL-LEVEL ACTION ITEMS

The disposition of the action items managed by the Sub-Panels is not recorded here but in the Sub-Panel Reports.

### 10.6 Old Actions

A-P-96-1: The Sub-Panel Chairmen to conduct an exchange of views on the redefinition of the responsibilities of the sub-panels and to report back at the next meeting.  
Actionees: Sub-Panel Chairmen  
Due Date: ASAP.

A-P-96-4: The Sub-Panel Chairmen to review the Draft Green Book on Testing by September 97.  
Actionees: Sub-Panel Chairmen  
Due Date: ASAP.

A-P-97-2: The Panel Chairman to put Testing Green Book on Bongo.  
Actionee: Panel 1 Chairman  
Due Date: ASAP.

### 10.7 New Actions

A-P-98-1: Establish P1 Application Notes server and inform Sub-Panel chairs.  
Actionee: Panel 1 Chairman  
Due Date: ASAP.

A-P-98-2: Arrange for TSG to place the three issues raised by P1A in the resolutions on the next TSG agenda (time codes, time correlation, on-board data system interfaces)  
Actionee: P1/TSG chairman  
Due Date: Nov. 4 1998

## 11 PANEL RESOLUTIONS

### 11.8 Related to Sub-Panel 1A

R-A-98-1 P1 resolves to request the MC to approve the release and distribution of the Telemetry Channel Coding Pink Sheets for Agency Review as soon as the Sub-Panel has completed, to its satisfaction, the Turbo Code specification and the Options Matrix.

- R-A-98-2 P1 resolves to request the MC to approve the release and distribution of the CCSDS Report on Space Link Security as a CCSDS Green Book as soon as the Sub-Panel has completed the work, to its satisfaction.
- R-A-98-3 P1 resolves to request the MC to progress the Packet Telemetry Services Blue Book Recommendation (CCSDS 103.0-B-1) to ISO for review and adoption as an ISO draft standard.
- R-A-98-4 P1 resolves to place the following three items for discussion and decision on the agenda of the TSG Meeting in November 1998:
- that the time code format change request for negative years be assigned to P2
  - that the time correlation service be assigned to P3 as new work item
  - that for the standardisation of on-board data system interfaces, networking and time distribution probably a new panel should be established.

### 11.9 Related to Sub-Panel 1E11.2 Related to Sub-Panel 1E

- R-E-98-1 P1 resolves to request the MC to approve the release and distribution for agency review:
- Rec. 2.2.7: Medium Rate Earth-to-Space Residual Carrier Systems.
- R-E-98-2 P1 resolves to request the MC to approve the deletion of the following recommendations from the existing Blue Book:
- Rec. 3.1.3A: Use of the 13.25 - 15.35 Ghz Band for Space Research, Cat. A
  - Rec. 3.1.5B: Use of the 31.8 - 34.7 Ghz Band for Space Research, Cat. B
- R-E-98-3 P1 resolves to request the MC to approve the release and distribution for agency review of the following Pink Sheets:
- Rec. 2.4.12A: Maximum Permissible Phase and Amplitude Imbalances for Suppressed Carrier (BPSK/QPSK) RF Modulators for Space-to-Earth Links, Cat. A
  - Rec. 2.4.12B: Maximum Permissible Phase and Amplitude Imbalances for Suppressed Carrier (BPSK/QPSK) RF Modulators for Space-to-Earth Links, Cat. B.

### 11.10 Related to Sub-Panel 1F

- R-F-98-1 P1 resolves to request the MC to approve the release and distribution for agency review of the issue-1 Red Book containing the new Space File Delivery Protocol, known as Protocol-X.

## 12 REGISTER OF P1 TASKS ON HOLD

At the P1 meeting in Greenbelt in 1994 it was decided to establish a category of tasks which are considered sufficiently important to be treated, however cannot be performed at the moment because of lack of resources, or disagreement on priority, or disagreement on precise definition, or a combination of these reasons.

It was decided that this register will be reviewed at each P1 meeting. Due to lack of time (there was only half of a day available) this was not possible at this meeting.

Subjects of this category identified in this meeting or earlier are:

- Spacecraft ID
- Pass management
- General aspects of upper layer protocols
- Data protection for space communications
- Time Code BB revision
- Sub-Packets
- CCSDS next generation space link recommendations.

**Acknowledgement:** The TSG Chairman thanks NASA for the excellent support, infrastructure and hospitality provided for the panel 1 plenary meeting No 20.

## **ANNEX**

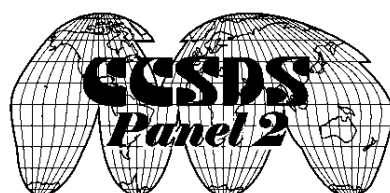
### Contents:

- P1 Chairman Progress Report (K. Lenhart)
- P1A Chairman Progress Report (M. MacMedan)
- P1E Chairman Progress Report (J.-L. Gerner)
- P1F Chairman Progress Report (A. Hooke)
- P1J Chairman Progress Report (F. Flores-Amaya)
- Space Link Reference Model - Status Report (T. Yamada)
- AOS Data Link Protocol and Telemetry Data Link Protocol - Draft White Books, Issue 1 (T. Yamada).

**ATTACHMENT R**  
**PANEL 2 REPORT**

# CCSDS Panel 2 Report to MC

June 1998



## Proposed Resolution



- That “*CCSDS Panel 2 Methodology for Development of Recommendations*” be published as a Yellow Book

## WP300 - Control Authority



- Clarifying CA programmers interface (API)
- Defining CA Agent services
- Clarifying how the Control Authority fits into the broader ISO registration process
  - there are several ISO registration systems

## WP500 - Languages



- Data Entity Dictionary Spec. Language
  - new draft of DEDSL addresses overlap with ISO 11179-3 - HOWEVER
  - new draft X3.285 is on the horizon as successor to ISO11179.
    - It is believed that this will not cause a problem
  - CNES are preparing new draft of DEDSL for Fall meeting



### ■ PVL review

- it is intended to allow accented characters to occur in PVL - several alternatives under investigation

### ■ Catalogue Interoperability Protocol (CIP-B) developed under CEOS.

- As previously reported CEOS want to submit CIP as an ISO DIS
- via Panel 2 or direct to ISO TC20/SC13 or other ISO SC?

## WP700 - Archiving



- Red Book, and simultaneous submission as ISO DIS - slipped by 6 months to November 1998
- Several workshops organised around OAIS and follow-on standards

## TSG-97-6:



- **P2 to note that there may be some common interests with P2 Metadata and SCPS file transmission**
- Noted - there is a more important related issue for Protocol-X because Metadata may be being wrapped within file transfer for user convenience. Perhaps this should be reviewed in terms of ad-hoc interpanel working group.

## General Point



- In general the other Panels should consider referring to P2 when issues of data packaging arise.
- NB P2 will **NOT** simply say "**use SFDU's**". Use of Panel 2 work is particular important when there is the possibility of multiple formats or changing attribute sets.

## Item 5.1: CCSDS Vision and Mission Statement



■ See P2 comments - to be consistent with  
Panel Mission statement - change

■ “access and exchange space mission  
information across a data network”

• to

■ “access, exchange, understand and archive  
space mission information”

## Current Work Plan for Panel 2



Research	Development	Deployment
WP200: Requirements	WP300: Control Authority - registration	WP600: Software
Complex Objects and Process Classes plus Object-based New Work Plans	WP500: Languages; - EAST - DEDSL	P2 Promotion Various OAIS workshops
Concept papers	WP400: Structures - to implement new classes etc	
	WP700: Archives	

## Item 5.4 Panel 2: Road Map to the Future



		Data Administration			
CA Software		Control Authority Services		Metadata Registry Interoperability	
Open Archival Information Systems (OAIS)					
Reference Model		Archive Standards		Archive Accreditation Procedures	
Data description languages and tools					
DDL (EAST)	Data Dictionary Specification		Objects modeling		Interoperable Dictionaries
Information Packaging					
Referencing Environment		Naming Conventions		Object Templates	
97	98	99	00	01	02

## Item 12.1 Information to Implementers/Workshops

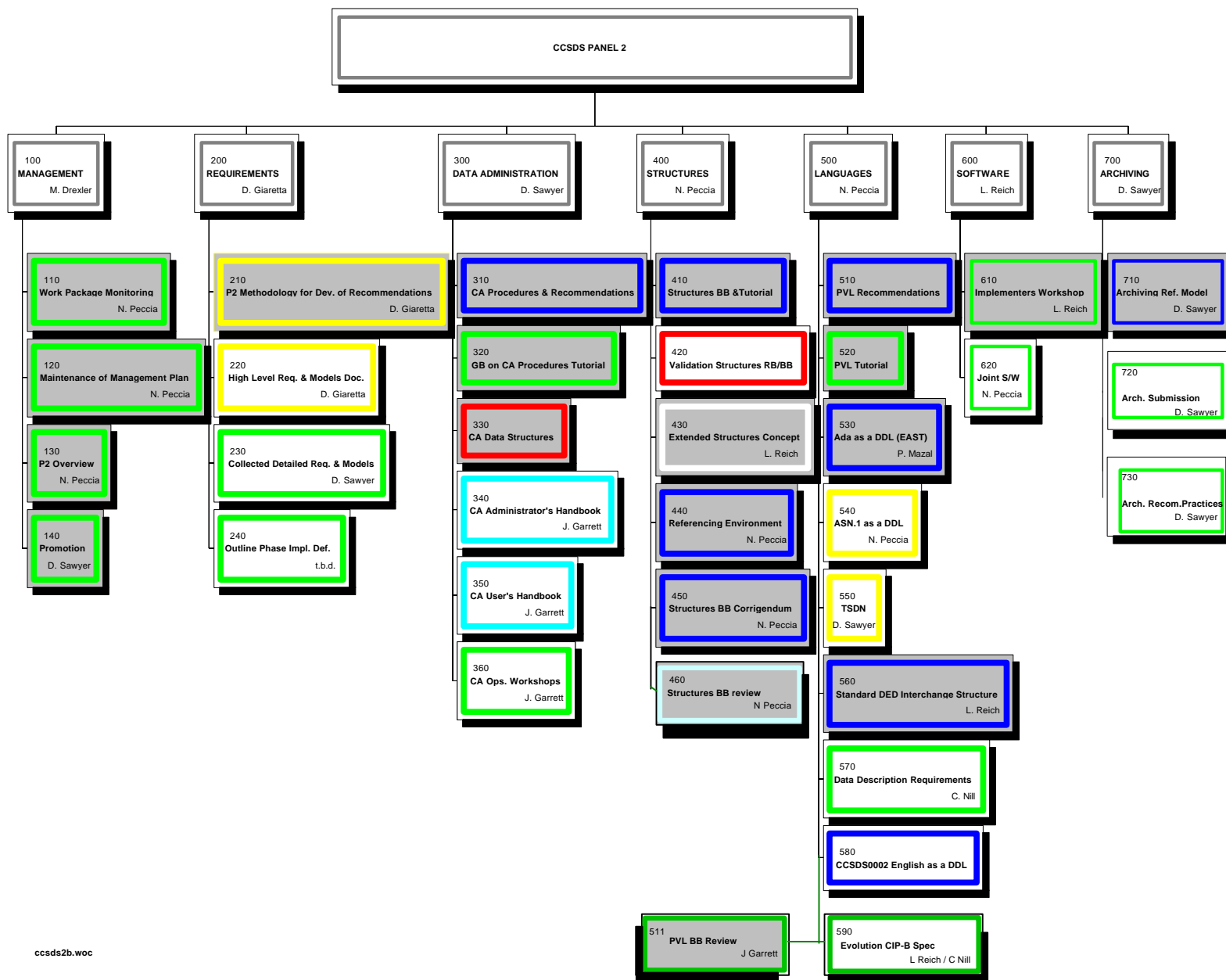


- Multiple Archive workshops in US and other countries
- Software produced:
  - NASA - Workbench and several spin-offs
  - ESA - Control Authority s/w plus other tools
  - CNES - EAST tools
    - Supported by contract - (prerequisite for commercial exploitation?)
  - BNSC - Work on interface definitions

## P2/P3 common interests



P2 work item	Maybe P3 interested in?
Packaging	Transfer of SLA's and related documents
Control Authority/Registration	Register format of SLA's types
	Assignment of Identifiers
Data Description Language	Describe SLA's - what description language for types? - what description language for contents?
Data Dictionaries	Define terms in SLA's
Archive	Archive methods for SLA's



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**ATTACHMENT S**  
**PANEL 3 REPORT**

**CCSDS**  
**Panel 3**

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**PANEL 3**  
**PROGRESS REPORT TO**  
**Technical Steering Group**

***Maurice Winterholer***

*P3 CHAIRMAN*



Panel 3 Report to MC and TSG Houston, USA May 1998

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**CCSDS**  
**Panel 3**

---

**PRESENTATION**

---

- Objectives
- Workplan
  - Document Tree
  - Work Breakdown Structure
  - Planning and Milestones
  - Organisation/ Work priorities
- Present Achievement :Documentation production
- P3 Workshop #20 Activities
- Action Items
- Meetings
- Resolutions
- Conclusions



Panel 3 Report to MC and TSG Houston, USA May 1998

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## **CCSDS Panel 3**

### **PANEL 3 OBJECTIVES**

- The challenge for CCSDS Panel 3
  - Panel 1 Recommendations regarding the space link have been highly successful, facilitating cross support across the space link interface and spurring development of commercial, off-the-shelf components
  - A major impediment to cross support is the lack of standardized interfaces between elements of the ground systems
  - Need to develop standards for cross support interfaces between elements of the ground systems
- P3 Charter
  - Identify and define cross support services which may be exchanged on the ground during cross support activities between user and provider Agencies
  - Select a suite of available standard communication protocols for use in cross support applications
  - Identify appropriate safeguarding techniques for user authentication and data object protection



Panel 3 Report to MC and TSG Houston, USA May 1998

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## **CCSDS Panel 3**

### **PANEL 3 OBJECTIVES**

The present efforts are focused on the production of the Space Link Extension Services Recommendations.

The SLE Services support the provision of the Space Link Services, for which Panel 1 has developed Recommendations.

The SLE Recommendations complement them with a range of services required to configure, operate, and supervise the ground data systems.

The SLE services involve Transfer Services and Management :

- ° The SLE Reference model defines functional and management views of the common characteristics of services for data exchange
- ° The Service Management Recommendation specifies the management information required to provide them, the interfaces that are involved and the sequencing that is necessary.



Panel 3 Report to MC and TSG Houston, USA May 1998

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## CCSDS Panel 3

### WORKPLAN

*The Work plan was revised and updated at the P3 Workshop 20, in HOUSTON, TX USA May 4-8, 98.*

#### 1. WORK PRIORITIES MAINTAINED on the production of :

- SLE Service management recommendations
- SLE Transfer Services recommendations :

*Released as Red before May 98 : CLTU,*

*Submitted for Red before May 98 : RAF, RVCF, FSP*

*To be submitted for Red in June 98 : TCF, MCOCF*

#### 2. REFINEMENT OF EXISTING WORK PACKAGES & ACTIVATION

##### ° WP300 ( SLE Service Specification)

- expanding of WP's 310, 320 for new services
- expanding of W 340 for service management framework
- creation of WP 350 for service management

##### ° WP 510 (Telecommunication Specifications for SLE Services)

- creation of WP 511(SLE-API), WP512 (SLE security Framework)

#### 3. ORGANISATION UPDATE :

- initiation of TWO new Working Groups WG4, WG5



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## CCSDS Panel 3

### WORKPLAN

#### Work plan : organisation, tasks and schedule

*(Work plan document will be posted on Bongo server)*

<ftp://bongo.jpl.nasa.gov/pub/ccsds/p3> : wp0598w2.doc

- Work breakdown structure for Panel 3
- Tasks descriptions
- Work packages status
- Document production milestones

##### - Organisation : 5 Working groups

- |                                 |                      |
|---------------------------------|----------------------|
| / WG1 SLE Service Management FW | F. Brosi (NASA/GSFC) |
| / WG2 SLE Return Link Services  | M. Pilgram (DLR)     |
| / WG3 SLE Forward Link Services | M. Pilgram (DLR)     |

"New"

- |  |                       |
|--|-----------------------|
| ----> / WG4 SLE Functional Groups MO   | W. Hell (ESA/ESOC)    |
| ----> / WG5 SLE communication/security | M. Stoloff (NASA/JPL) |

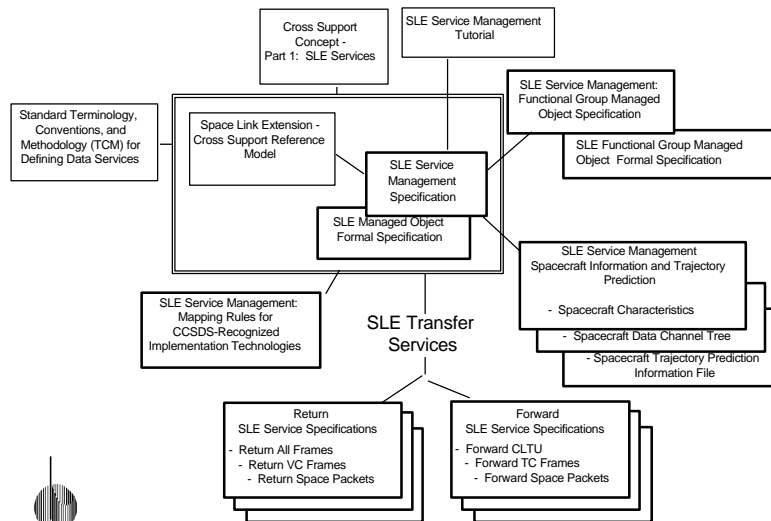


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## CCSDS Panel 3

### SLE Documents

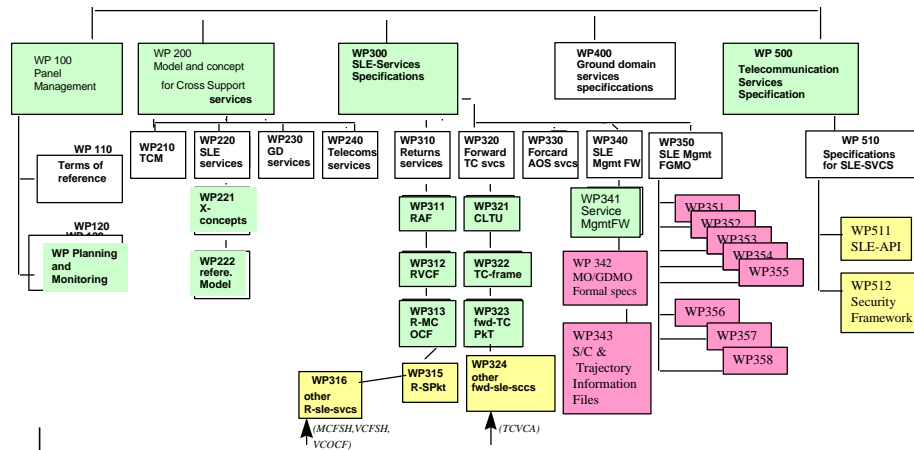


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## CCSDS Panel 3

### WORKBREAKDOWN STRUCTURE FOR PANEL 3



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## CCSDS Panel 3

### Work Package Status

<u>WP ID</u>	<u>PACKAGE TITLE</u>	<u>STATUS</u>
WP 110	Terms of reference	<i>closed / YB</i>
WP 120	WP Planning and monitoring	<b>active</b>
WP 210	TCM	<i>closed / GB</i>
WP 221	Cross Support Concept	<i>active / GB</i>
WP 222	SLE-Reference Model	<i>active / BB</i>
WP 311	RAF Service Specification	<b>active</b>
WP 312	Return VC Frame	<b>active</b>
WP 313	Return MC-OCF	<b>active</b>
WP 321	CLTU Service Specification	<b>active</b>
WP 322	Forward TC Frame Specification	<b>active</b>
WP 323	Forward Forward Space Packet	<b>active</b>
WP 341	SLE-Service Management FW Specs	<b>active</b>

active : WP under process  
closed : WP achieved GB/BB/YB  
waiting : WP not started



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## CCSDS Panel 3

### Work Package Status

<u>WP ID</u>	<u>PACKAGE TITLE</u>	<u>STATUS</u>
WP 315	Other Return Services (1)	<b>active</b>
WP 324	Other Forward Services (1)	<b>active</b>
WP 351	FGMO specification (RAF aspects)(2)	<b>to be started</b>
WP 356	FGMO specification (CLTU aspects) (2)	<b>to be started</b>
WP 511	SLE application programming interface(3)	<b>to be started</b>
WP-512	SLE security framework(3)	<b>to be started</b>

(1) MC Frame, MC-FSH, VC-OCF, VC-FSH, RSP and TC-VCA (ESA),  
(2) this work in WG4 covers all RF and modulation production issues,  
(3) this work is done in WG5



Panel 3 Report to MC and TSG Houston, USA May 1998

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## CCSDS Panel 3

### DOCUMENTS PRODUCTION SCHEDULE

	97	1998	1999	2000
SVC Mgmt Tutorial	White White	Red White	Blue Green	
GDMO Spec Information files		White	Red White	Blue Red
FGMO (RAF)		Draft	White	
FGMO (CLTU)		Draft	White	
RAF Service VC Frame		Red Red	Blue Blue	
MC-OCF		Red	Blue	
TC CLTU		Red	Blue	
Frwd TC Frame		Red	Blue	
Frwd Packet		Red	Blue	
SLE application API			Draft	White
SLE Security issues			Draft?	



CNES

Panel 3 Report to MC and TSG Houston, USA May 1998

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## CCSDS Panel 3

### ORGANISATION

The Working Groups organisation structure exists since 1995.

**Updates of the Working Group structure were discussed and the creation of Two new Groups decided in Houston, May 1998**

WG 1 : responsible for WP 210 (TCM), WP 220 ( SLE Services Models and Concepts) and WP340 (SLE Management). This group maintains the :

1. TCM - *existing Green Book No change needed*
2. Cross support Concept - *existing Green Book revision needed*
3. SLE Reference Model documents - *existing Blue Book revision needed*
4. SLE Service Management Tutorial - *existing draft (NASA) revision needed*
5. SLE Service Management Specification - *existing ; 3 more WB planned ; RED in 1998*
6. SLE Managed Object Formal Specifications - *to be developed for May 98 (NASA/ESA)*
7. SLE Service Mngmt Information File Specifications - *need for Agency specific examples*
8. SLE Functional Group managed Object Specs - *to be started needs inputs from WG2/3*

Lead of WG1 : Fred Brosi (NASA/GSFC)



CNES

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## CCSDS Panel 3

### ORGANISATION (cont'd)

**WG2 : responsible for the WP310 ( SLE Return Services Specifications). This group develops the detailed specifications for the SLE Return Services, according to SLE Reference Model and Service Management Specification documents, with the following priorities :**

1. Return All Frames ( RAF) - existing WB (April 98); submitted to Red in April 98
2. Return Virtual Channel Frame (RVCF) - existing WB (April 98); submitted to Red in April 98
3. Return Master Channel OCF (RMC-OCF) - existing WB (April 98); to be submitted to Red in June 98
4. Return Master Channel FSH (RMC-FSH) - to be started ; 1 WB for Oct 98 (ESA)
5. Return Virtual Channel FSH (RVC-FSH)- to be started ; 1 WB for Oct 98 (ESA)
6. Return Virtual Channel OCF (RVC-OCF) - to be started ; 1 WB for Oct 98 (ESA)
7. Return Space Packet (RSP) - to be started ; 1 WB for Oct 98 (ESA)

**Lead of WG2 : Martin Pilgram (DLR)**

**WG3 : responsible for the WP320 (Forward Telecommand Services Specifications). This group develops detailed specifications for the SLE Forward Telecommand Services according to SLE Reference Model and Service Management documents, with the following priorities :**

1. CLTU - Red version in the process of Agencies review until April 24, 98
2. Telecommand frame - existing WB (April 98); to be submitted to Red in June 98
3. Forward Space Packet - existing WB (April 98); submitted to Red in April 98
4. Telecommand VCA - to be started ; 1 WB for Oct 98 (ESA)

**Lead of WG3 : Martin Pilgram DLR)**



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## CCSDS Panel 3

### ORGANISATION (cont'd)

**WG 4 : responsible for WP 350, this group will :**

- . Identify and analyse the (operational) management requirements for service provision and production (actions, notifications)
- .Attempt to map the parameters and management requirements to derived FGMOs (first English specification) and/or other MOs.
- .Generate the formal FGMO specification in GDMO

**Lead of WG4 : Wolfgang Hell (ESA/ESOC)**

**WG 5 : responsible for WP 510 (Telecommunication services for SLE services especially for WP 511 ( SLE API) and WP 512 ( SLE Services security)). This group will :**

- Specify a recommended application programming interface (API) for applications to interface to the SLE service element
  - Select appropriate safeguarding techniques for user authentication and data object protection to support implementation of the SLE services
  - Select a suite of available standard communication and related services and protocols to support implementation of the SLE services
- It initially addresses SLE-API and SLE security framework. Later it will expand to include additional other communications aspects (e.g., transport, "middleware," directory services)

**Lead of WG5 : Michael Stoloff (NASA/JPL)**



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## **CCSDS**

### **Panel 3**

#### **PRESENT ACHIEVEMENT**

##### **1. Work progress since VILLAFRANCA ( Nov 97)**

- production of revised WHITE BOOKS issues
- CLTU RED BOOK RELEASE
- 3 Other RED book submitted to Secretariat ( FSP, RAF, RVCF)

##### **2. Last issues of Documents release before HOUSTON**

WP 223 : SLE Service Management	: 910.5-W-1.14	April 98
WP 311 : Return AF Service	: 911.1-W-70	April 98
WP 312 : Return VC Frame	: 911.2-W-2	
WP 313 : Return MC-OCF Service	: 911.3-W-1.2	March 98
WP 321 : Forward CLTU Service	: 912.1-R-1	3 March 98
WP 321 : Forward CLTU Service UPDATED	: 912.1-XXX	April 98
WP 322 : Forward TC Frame Service	: 912.2-W-2.2	March 1998
WP 323 : Forward Space Packet Service	: 912.3-W-2	March 1998



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## **CCSDS**

### **Panel 3**

#### **PRESENT ACHIEVEMENT (cont'nd)**

##### **Panel 3 Workshop #20 Activities**

1. Agreement on Specific technical issues
2. Review of CLTU Red Book RIDs and Panel discussions
3. Review & revision of SLE Service Management Recommendation
4. Revision and alignment other SLE-Services specifications
5. Revised Panel 3 Work Plan and schedule
  - current workplan revision and update
  - new active tasks, new working groups
  - identification of new future work items
  - new working groups
6. Agreement upon future meetings
7. Assigned Action Items to accomplish planned work



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**CCSDS**  
**Panel 3**

**PANEL 3 SHORT TERM ACTIONS**

*(before Fall 98 workshop)*

**Service Management :**

- New version of SLE Service Management book ( 910.5-W-1.15), June 98
- Intermediate meeting location and dates
- Expert review of Parts of SM document ( Notification material)
- resolve Trajectory prediction MO issue

**SLE Transfer Services**

- TCF: red produced in May, after panel internal review to secretary in June
- MCOCF: red produced in May, after panel internal review to secretary in June
- CLTU : solve RIDs issues, update red book for a new red book version, discuss lite version
- New 5 white books for the remaining 6 not "AOS" services to be produced next panel meeting



Panel 3 Report to MC and TSG Houston, USA May 1998

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**CCSDS**  
**Panel 3**

**PANEL 3 SHORT TERM ACTIONS**

*(before Fall 98 workshop)*

**General:**

1. Workshop #20 Meeting Report (NASA)
2. Resolutions to CCSDS MC (P3 Chair)
3. Workplan document update ("")
4. Analysis of P2 recommendations ( DLR)
5. Allocation of ressources to WP ( all WG)



Panel 3 Report to MC and TSG Houston, USA May 1998

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## **CCSDS Panel 3**

### **MEETINGS of Panel 3**

#### **Past meetings :**

Workshop 16 in May 1-7 , 96 in PASADENA  
Workshop 17 in November,4-8 , 96 in OBERPFAFFENHOFEN  
Workshop 18 in May 19-23, 97 in SILVER SPRING  
Workshop 19 in November 3-7, 97 in VILLAFRANCA  
Workshop 20 in May 4-8, 98 in HOUSTON

#### **Working groups meetings in 1998 :**

- 2 intermediate meetings for WG1 (Jan/ESOC, March/ESOC)
- 2 intermediate meetings for WG2-3 (Jan/ESOC, March(JPL))

#### **Next P3 Workshop 21 :**

- Fall 1998 : ESA in DARMSTADT 26-30 Oct 98

#### **Futures intermediate Working groups meetings :**

WG1 : July 98 Europe Sept 98 (?)  
WG2/3 : TBD



Panel 3 Report to MC and TSG Houston, USA May 1998

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## **CCSDS Panel 3**

### **Resolutions/Requests**

1) P3 petitions the MC to issue the final version of the F-TC Service Specifications as Red Book. P3 will provide this document to the Secretariat by June, 1998.

Forward *TC-Frame Service* 911.2-R-1.0

2) P3 petitions the MC to request from the Agencies the list of the SLE services in which they are interested in the near future and the according priorities.

3) P3 requests to get from the agencies the documentation material relevant to the actual cross support interface implementation, as input to the work of the WG5 in the area of service management.

4) P3 requests the approval of its revised Work Plan.

- Expanded work breakdown structure
- New active tasks



Panel 3 Report to MC and TSG Houston, USA May 1998

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**CCSDS**  
**Panel 3**

**Resolutions/Requests**

- 5) P3 requests the CCSDS to approach ISO for the definition of an ICD specific to CCSDS, and to develop a relevant control authority for the naming of the various components, objects and data structure identified in P3 CCSDS recommendations ( Agencies, Complexes names, ASN1 definitions and Managed Object)
- 6) P3 expects to get inputs from P1J work for the "S/C Trajectory Prediction file" definition, and the corresponding management aspects.



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**CCSDS**  
**Panel 3**

**CONCLUSIONS :**

- ° Substantial progress
- ° Need for reinforced agencies support
- ° High priority on the production of the SLE-Service transfer Recommendations and the Service Management
- ° Start of complementary work in the area of management and communication interface.

***Thanks to NASA for the great hospitality in HOUSTON***



Panel 3 Report to MC and TSG Houston, USA May 1998

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**ATTACHMENT T**  
**TSG REPORT**

## **CCSDS - TECHNICAL STEERING GROUP**

**REPORT OF  
CCSDS TSG MEETING NO 14  
IN HOUSTON  
11TH & 12TH MAY 1998**

Issue 1.0, Date June 12, 1998

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ANNEX

**PARTICIPANTS**

<b>Last Name</b>	<b>First Name</b>	<b>Agency</b>	<b>Company</b>	<b>Panel/other Assignment</b>
Andean	David	IC/CRC		
Baize	Lionel	CNES		
Brosi	Fred	NASA/GSFC	OSC	P1, P3
Byington	Robert	NASA	Boeing	
Calzolari	Gian Paolo	ESA/ESOC		P1
Drexler	Manfred	DLR/GSOC		P2
Fisher	Stephen	BNSC	Logica	P1
Flores-Amaya	Felipe	NASA/GSFC		P1
Foley	Steve	BNSC/DERA		
Gannett	Thomas	NASA	J&T	Secretariat
Garrett	John	NASA		
Gaylor	Kent	NASA	LinCom	
Gerner	Jean-Luc	ESA/ESTEC		P1
Giaretta	David	BNSC/RAL		P2
Giaretta	David	BNSC		P2
Hell	Wolfgang	ESA/ESOC		P3, P1
Hooke	Adrian	NASA/JPL		P1
Hooke	Adrian	NASA/JPL		P1
Inoue	Yoshio	NASDA		
Jones	Michael	NASA/JPL		
Klaseen	Elin	NASA	SRI Int'l	
Kummer	Horst	ESA/ESOC	RSI	P1, TSG
Lapaian	Gerard	CNES		
Lenhart	Klaus	ESA/ESOC		P1, TSG
MacMedan	Merv	NASA/JPL		P1
Marshall	Simon	BNSC	Logica	
Miller	Warner	NASA/GSFC		P1
Moury	Gilles	CNES		P1
Muzny	Larry	NASA	Lockheed	

# REPORT OF THE MANAGEMENT COUNCIL - MEETING MINUTES

Last Name	First Name	Agency	Company	Panel/other Assignment
			Martin	
Ogawa	Shinji	NASDA		
Peccia	Nestor	ESA/ESOC		P2
Pinna	Gian Maria	ESA/ESRIN		P2
Pritchard	Jim	NASA/GSFC		P1
Reich	Lou	NASA	CSC	P2
Sawyer	Donald	NASA		P2
Stephens	Robert	NASA	SGT Affili- ate	P2, MC, TSG
Taylor	Chris	ESA/ESTEC		P1
Townley	David	NASA		MC
Townley	Dave	NASA/HQ		Secretary, MC
Vanhofe	Martial	CNES		
Vaughan	Peter	BNSC/RAL		MC
Vernon	Lynn	NASA/JPL		
Weiss	Howard	NASA/SPARTA		
Winterholer	Maurice	CNES		P3
Xu	Xudong	CAST		
Yamada	Takahiro	ISAS		P1, P3
Zhao	Heping	CAST		
Zheng'an	Zhai	CAST		

## **1. AGENDA**

A Draft Agenda had been distributed by Klaus Lenhart, the Convener of the meeting, before the meeting. After commenting before the meeting and discussion at the beginning of the meeting it was approved and executed as follows:

- Approval of Agenda
- Approval of Minutes
- Report on Panel/Sub-Panel progress since last TSG Meeting
- Review of Actions
  - Actions requiring Reporting or Discussion
  - Actions either completed or to be reviewed later in the Agenda
- Planning
  - CCSDS Vision and Mission Statement
  - Current Work Plan
  - P1J Work Plan
  - A Road Map to the Future
- Information on Technical Progress
  - OAIS (Open Archiving Information System)
  - Protocol-X (new file transfer protocol)
  - Turbocodes Summary
  - Data Compression
- Space Link Reference Model
- Addressing of Space Missions
- Data Protection
- Application of CCSDS Products
  - Conformance Proformas/Options Matrix
  - CCSDS Application Matrix
  - Questionnaires concerning application of CCSDS Recommendations
  - Status of INTEGRAL related Implementation
  - Use of CCSDS Recommendations for the Space Station Programme
- NASA Report on SuperMoca
- Support of CCSDS Public Relations
  - Information to Implementers/Workshops
  - Setting up of CCSDS Presentations for Symposia
- Schedule of Panel, Sub-Panel and Working Group meetings
- Planning of the next TSG meeting
- Agreement on Contents of Report to Management Council
- A.o.B.

For a detailed version of the agenda see in the annex.

## **2. APPROVAL OF MINUTES OF LAST MEETING**

The Minutes were approved.

## **3. REPORT ON PANEL PROGRESS SINCE LAST TSG MEETING**

### **3.1 Panel 1**

The report is included in the Annex. Planning was discussed under point 6 below.

Issues:

- lack of technical experts manpower is holding up the activities
- continuity of attendance of experts in technical panel meetings is essential
- the formal status of (new) work items was discussed; the discussion was inconclusive with respect to the need of approving also WB work. (The subject was picked up again at the P1 Plenary, see P1 minutes).<sup>(1)</sup>

### **3.2 Panel 2**

The report given by the Chairman of P2 (David Giaretta) is included in the annex.

### **3.3 Panel 3**

The report given by the Chairman of P3 (Maurice Winterholer) is included in the annex.

M. Winterholer criticized the lack of continuity of the participation of certain experts in the panel work. This makes it very difficult to meet the commitment laid down in the various schedules. (See action TSG-98-2)

Panel resolutions were discussed and agreed.

## **4. REVIEW OF ACTIONS**

### **4.1 Actions requiring Reporting or Discussion**

- TSG-97-1: All Agencies Delegates and Panel Chairs should review and update the mail distribution list covering their area of responsibility. Continuing.
- TSG-97-2: All contributors should provide their written contributions to TSG meetings in electronic form so that the minutes could easily be distributed on the WWW. Minutes of TSG 14 will be distributed in hardcopy to attendants and agency representatives, for cost and efficiency reasons. The chairman will explore solutions for electronic distribution in the future (see action TSG-98-3).
- TSG-97-6: P2 (D. Giaretta) to note that there may be some common interests with Panel 2 metadata for SCPS file transmission (related to agenda topic 6.2). Closed.
- TSG-97-7: K. Lenhart to discuss the patent issue on turbo codes with J.-L. Gerner and the ESA Legal representative. Presentation by J.-L. Gerner attached. Will be further discussed at P1 meeting and should also be discussed at next MC.

### **4.2 Actions either completed or to be reviewed later in the agenda.**

See below.

## **5. PLANNING**

### **5.1 CCSDS Vision and Mission Statemen**

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<sup>(1)</sup> The TSG Chairman consulted the CCSDS Procedures Manual after the meeting and concluded that the CCSDS Procedures do not require the approval of the MC prior to the production of a White Book.

A presentation was given by A. Hooke (see annex). The meeting agreed in principle on Mr. Hooke's statements, however it was noted that the appropriate resources would have to be made available by the agencies. The issue how to involve industry in the definition and processing of new work items was discussed and suggested to be reconsidered by MC (see action TSG-98-6).

K.G. Lenhart complemented the presentation of A. Hooke by suggesting a concrete approach for defining needs and drivers for a strategic plan (see annex).

## **5.2 Current Work Plan**

The three Panel Chairmen presented their current work plans (see annex). After some discussion (P3 was asked to consider a classification of WPs into research, development and deployment and to add a schedule. M. Winterholer will put this on Bongo) the plans were approved.

## **5.3 P1J Work Plan (Action TSG-96-11)**

Was presented by Mr. Flores-Amaya (see annex) and agreed. A discussion took place on the name of the sub-panel. It was decided to accept the name proposed by the sub-panel, namely "Navigation Data".

## **5.4 A Road Map to the Future**

Based on A. Hook's presentation (see annex) a discussion took place how to best arrive at a coordinated overall strategic future work plan in form of a "Roadmap to the Future". As conclusion, a working group was formed which was charged with the task of working out this plan for submission to the TSG and MC in Fall 1998. The convenors are H. Kummer and T. Gannett; members are K. Lenhart, M. MacMedan, A. Hooke, J.-L. Gerner, D. Giaretta and M. Winterholer. The MC is asked to request input from the agencies. (See action TSG-98-7).

# **6. INFORMATION ON TECHNICAL PROGRESS**

## **6.1 OAIS (Open Archiving Information System)**

Presentation by Lou Reich (see annex). A reference model RB is expected by November 1998. This effort shows that CCSDS can be effective in leading broad standards development efforts which are also applicable outside the space community.

## **6.2 Protocol-X (new file transfer protocol)**

Presentation by Ch. Taylor (see annex). Draft GB available. RB is planned for end 98, BB during the second half of 99.

## **6.3 Turbocodes Summary**

Presentation by G.P. Calzolari (see annex). The discussion of detailed technical subjects were transferred to P1 meeting the same week.

## **6.4 Data Compression**

Presentation by G.P. Calzolari (see annex). TSG took note of the status of work on lossless data compression and of the considerable benefits of both turbo codes and compression offers to projects (better link budget, more efficient use of bandwidth). TSG noted the proposed research work on quasi-lossless data compression. There are technical relations to similar ISO work on data compression. Warner Miller will provide coordination (see TSG-98-8).

# **7. SPACE LINK REFERENCE MODEL**

Presentation by T. Yamada (see annex). It covered the new space link protocol architecture, which will provide a more consistent layering and a basis for restructuring the existing books. The TSG endorsed the relevant activities. The corresponding technical issues were proposed to be further discussed in the P1 meeting. P3 would be effected only with respect to the renaming of some parameters. A. Hooke made a contribution to the renaming of layer elements.

The following TSG resolution was proposed to be passed on to the MC:

Recognizing the high quality and overall excellence of the work of Mr. Takahiro Yamada in developing a new model of CCSDS space link protocols, the TSG resolves to ask the CCSDS MC to transmit a letter of commendation to ISAS, specifically expressing the appreciation of CCSDS for Mr. Yamada's participation.

## **8. ADDRESSING OF SPACE MISSIONS**

F. Brosi and Don Sawyer presented the problem (see annex). The subject is highly interlinked between P1, P2 and P3. A working group was formed to work out technical solutions. (Chairman: D. Sawyer; Members: A. Hook, F. Brosi, T. Yamada, W. Hell, N. Peccia, L. Reich), (see action TSG-98-15).

## **9. DATA PROTECTION**

A. Hooke introduced the subject emphasising the need for data security/protection. P1 has already produced a draft GB covering the space link. P3 addressed the issue at the meeting (see annex). An Ad Hoc Working Group was established to cover the subject for the complete CCSDS space data system. Chairman, members of the group and a draft charter are attached in the annex. See also action TSG-98-9.

## **10. APPLICATION OF CCSDS PRODUCTS**

### **10.1 Conformance Proformas/Options Matrix (Action TSG-97-12)**

Three tasks have to be resolved:

- (1) CCSDS has to specify in appropriate attachments to the BBs the mandatory and optional elements of the Recommendation.
- (2) On the basis of these attachments the implementing entities have to communicate the features which have been implemented in their standards/infrastructure/projects
- (3) A tool is required by which the conformance of a particular implementation with the corresponding Recommendation can be evaluated.

An extensive discussion took place, in particular on task 1, resulting in a tendency to favour the ISO protocol implementation conformance statements (PICS) (see annex). To this end Tom Gannet was requested to provide references to the respective ISO standard (see actions TSG-98-10 and TSG-98-11).

### **10.2 CCSDS Applications Matrix: presentation of a NASA study**

A presentation on a relevant NASA study was given by Tom Gannett covering the use of CCSDS Recommendations on telemetry and telecommand by space missions (see annex). It shows that more than 50 missions will have used by launch date 2000 CCSDS Recommendations. The actual number of CCSDS-compliant missions after 2000 will be much larger. In this context the ESA study on "Enhancement of Interoperability between ESA and NASA Missions", based on CCSDS Recommendations, was again briefly presented. The conclusion was that it would be desirable to update the study to include the missions and infrastructure of other CCSDS agencies.

### **10.3 Questionnaires concerning application of CCSDS**

The TSG Chairman presented the questionnaires which had been distributed electronically in accordance with Oxford Management Council decision (see annex). Only from NASDA relevant input was received (see annex). DLR promised to provide input within a week. It was concluded that the MC repeats its request to provide input (see action TSG-98-13).

#### **10.4 Status of INTEGRAL related Implementation**

Messrs. MacMedan (JPL) and Hell (ESOC) informed the meeting on the status of the design of CCSDS-relevant elements of the INTEGRAL mission support (see annex). In this context W. Hell reminded P1J on the need to obtain a definition of Spacecraft Trajectory Prediction File for this project. (See action TSG-98-1)

#### **10.5 Use of CCSDS Recommendations for the Space Station Programme**

Two presentations were given by Messrs. Muzny (Lockheed Martin) and Byington (Boeing) on the application of CCSDS Recommendations to the ISS data system (see annex). In conclusion Mr. Byington stated that without CCSDS pre-defined data formats it would most likely not have been feasible to integrate so many different subsystems from so many different sources. The suppliers would all have requested proprietary formats and unique code plus hardware.

### **11. NASA REPORT ON SUPERMOCA**

Presentations were given by Messrs. Hooke and Jones (JPL). A demonstration of a prototype realising the concept of virtual devices was run by Ms. Klaseen (SRI International).

### **12. SUPPORT OF CCSDS PUBLIC RELATIONS**

#### **12.1 Information to Implementers/Workshops**

Three workshops were announced:

- (1) First ESA Workshop on Tracking and Command Systems: 24.-26.June 1998 (see annex)
- (2) EOSS Workshop: 15.&16. October 1998 (details to be obtained from P2 Chairman)
- (3) BNSC Workshop on CCSDS, New Technologies, New Standards: 9. November 1998 (see annex).

#### **12.2 Setting up of CCSDS Presentations for Symposia**

The TSG Chairman suggested that CCSDS-related presentations of a more general nature be made available electronically for two purposes:

- (1) general information on the official CCSDS homepage;
- (2) presentations for CCSDS internal use on a CCSDS internal server.

### **13. SCHEDULE OF PANEL, SUB-PANEL AND WORKING GROUP MEETINGS**

After discussion, taking into account in particular the above mentioned workshops and other constraints, the following coordinated meeting schedule was arrived at:

- P1F: Oct. 14. - 16. 98 in Toulouse
- P1A: Oct. 19. - 21. 98 in Darmstadt
- (- ISO: Oct. 19. - 22. 98 in Vienna)
- Road Map WG: Oct. 20. - 22. in Austria
- P2: Oct. 26. - 30. 98 in Europe
- P3: Oct. 26. - 30.98 in Darmstadt
- P1J: Oct. 26. - 30. Darmstadt (tbc)

Small working group meetings for urgent P1E items will be scheduled separately.

## 14. PLANNING OF THE NEXT TSG MEETING

- TSG/MC/ISO-SC13: Nov. 4.-6.98 in Darmstadt

## 15. AGREEMENT ON CONTENTS OF REPORT TO MANAGEMENT COUNCIL

There was no discussion on this point. The Chairman produced immediately after the meeting a preliminary report, which was made available to the MC. An action list was produced at the same time and distributed by E-mail soon after the meeting.

## 16. A.O.B.

No other business was brought up.

## 17. ACTIONS

### 17.1 Old Actions

TSG-97-1 All Agencies Delegates and Panel Chairs should review and update the mail distribution list covering their area of responsibility.

Status: Continuing  
Actionees: Agency Delegates and Panel Chairmen  
Due Date: ASAP

TSG-97-2 All contributors should provide their written contributions to TSG meetings in electronic form so that the minutes could easily be distributed on the WWW.

Status: Continuing  
Actionees: All contributors to TSG meetings  
Due Date: ASAP after the meetings.

### 17.2 New Actions

TSG-98-1 Deliver input to P3 on the definition of the "Spacecraft Trajectory Prediction File".

Actionee: P1J Chairman  
Due Date: End 1998

TSG-98-2 Inform MC on the concern of all Panels on the lack of continuity of agency expert participation in technical meetings. MC should be asked to take appropriate action.

Actionee: TSG Chairman  
Due Date: 8. June 1998

TSG-98-3 Identify a server for electronic exchange of TSG minutes and related information.

Actionee: TSG Chairman  
Due Date: 1. July 1998

REPORT OF THE MANAGEMENT COUNCIL - MEETING MINUTES

- TSG-98-4      All presenters to transfer files of their presentations to the server addressed in action TSG-98-3
- Actionees:      All Presenters of TSG 14  
                  Due Date:      1. August 1998
- TSG-98-5      All persons concerned should review their files on the CCSDS Bongo server and remove files no longer needed, because the allocated space is nearly used up.
- Actionees:      All owners of files on Bongo  
                  Due Date:      ASAP
- TSG-98-6      Request MC to discuss the involvement of industry in the definition of new work items.
- Actionee:      TSG Chairman  
                  Due Date:      8. June 1998
- TSG-98-7      Request MC to ask agencies to provide input to the "Roadmap to the Future"-WG addressing the items contained in K.G.Lenhart presentation on drivers and needs by September 1st 1998.
- Actionee:      TSG Chairman  
                  Due Date:      8. June 1998
- TSG-98-8      Coordinate CCSDS data compression activities with ISO (JPEG Group)
- Actionee:      W. Miller
- TSG-98-9      Present results of the Ad Hoc WG on Data Protection to the next TSG.
- Actionee:      H. Weiss  
                  Due Date:      4. Nov. 1998
- TSG-98-10     Provide references of ISO standards containing the definition of PICS and relevant information.
- Actionee:      T. Gannet  
                  Due Date:      30. June 1998
- TSG-98-11     Members of TSG to study the standards referenced in action TSG-98-10 in view of the need to add options summary information to CCSDS Recommendations and to add conformance summary information to agency documents describing their application.
- Actionees:      All  
                  Due Date:      Next meeting
- TSG-98-12     The secretariat to inquire whether selected ISO standards can be obtained free of charge for CCSDS internal use only.
- Actionee:      D. Townley  
                  Due Date:      30. June 1998

## REPORT OF THE MANAGEMENT COUNCIL - MEETING MINUTES

TSG-98-13 To ask MC to repeat request to CCSDS agencies for providing input to questionnaires on CCSDS applications.

Actionee: TSG Chairman  
Due Date: 8. June 1998

TSG-98-14 P3 to classify their work packages into the categories research, development and deployment including a schedule and to put the result on Bongo.

Actionee: Chairman of P3  
Due Date: 30. October 1998

TSG-98-15 The WG on Addressing of Space Missions to work out a concept taking into account all conceivable future mission requirements and to report to the next TSG.

Actionee: D. Sawyer  
Due Date: 4. November 1998

TSG-98-16 The WG on "Roadmap to the Future" to work out a strategic CCSDS future Plan of work taking into account all conceivable future mission requirements and to report to the next TSG.

Actionees: T. Gannett and H. Kummer  
Due Date: 4. November 1998

TSG-98-17 Pass on suggestion for a MC Resolution concerning Mr. Takahiro Yamada's contribution to the development of a new CCSDS space link protocols model.

Actionee: TSG Chairman  
Due Date: 8. June 1998.

### 18. ACKNOWLEDGMENTS.

The Panel Chairman thanks NASA/JSC for the excellent support, infrastructure and hospitality provided for the TSG Meeting No 14 on May 12th & 13th 1998 in Houston.

## ANNEX

### Contents:

1. Detailed Agenda
2. P1 Chairman Progress Report (K. Lenhart)
3. P2 Chairman Progress Report (D. Giaretta)
4. P3 Chairman Progress Report (M. Winterholer)
5. Turbo Codes for Space Science - Patent Issue (J.L. Gerner)
6. Vision, Change Goals, Mission, Approach (A. Hooke)
7. Contribution to Discussion of Future CCSDS Work Plan (K. Lenhart)
8. P1J Report and Plan of Work (F. Flores-Amaya)
9. Emerging Standards Roadmap (A. Hooke)
10. Status of ISO Reference Model for an Open Archival Information System (L. Reich)
11. CCSDS File Transfer (Ch. Taylor)
12. Frame Error Rate Performance Improvements with Turbo Codes (G.P. Calzolari)
13. Report on Sub-Panel 1A Data Compression Working Group (G.P. Calzolari)
14. Space Link Reference Model - Status Report (T. Yamada)
15. CCSDS Naming and Addressing: Significant Issues (D. Sawyer and F. Brosi)
16. P3 Security Issues (W. Hell)
17. CCSDS Ad-Hoc Working Group on Data Protection
18. Protocol Implementation Conformance Statement (PICS) for Advanced Orbiting System (AOS) Path Service (F. Brosi)
19. NASA Study on Use of CCSDS-Recommended Telemetry and Telecommand Formats (T. Gannett)
20. Questionnaires I, II and III concerning the use of CCSDS Recommendations for agency standards, infrastructure and missions (K. Lenhart)
21. NASDA CCSDS Implementation (S. Ogawa)
22. NASA/JPL Cross Support of ESA's INTEGRAL Mission - A brief Status Report (JPL)
23. Space Link Extension Services: ESA's Implementation Plan for INTEGRAL (W. Hell)
24. International Space Station Communications - Use of CCSDS (L. Muzny)
25. Use of CCSDS Recommendations on International Space Station (R. Byington)
26. SuperMOCA Reports (A. Hooke, M.K. Jones)
27. Notice of UK CCSDS Workshop (S. Fisher)
28. Notice on First ESA Workshop on TTC Systems (J.L. Gerner).

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**ATTACHMENT U**  
**CURRENT LIST OF LIAISONS**

## CCSDS Liaisons

### MC-S97-26

**MC-S97-26. Appointment/Confirmation of CCSDS Liaison Representatives. CCSDS appoints or confirms the following individuals as its Liaison Representatives to the groups indicated:**

	Representative	Liaison To	Subject (if appropriate)
1.	Bastikar, A	TC 20/SC 14	General Issues
2.	Sawyer, D.	JTC1/SC 2	Panel 2
3.	Sawyer, D.	TC 46/SC 4	Panel 2
4.	Sawyer, D.	TC 211	Panel 2
5.	Jabs, E.	TC 20/SC 14/ WG 3	Panel 3
6.	Townley, D.	COSPAR	General Issues
7.	Townley, D.	INTELSAT	General Issues
8.	Townley, D.	ISPRS	General Issues
9.	Townley, D.	CEOS	General Issues
10.	Townley, D.	WMO	General Issues

**ATTACHMENT V**

**PROPOSED NEW LANGUAGE FOR THE PROCEDURES MANUAL  
RELATING TO SOFTWARE DEVELOPMENT  
IN ASSOCIATION WITH NWIs**

## **MC-S97-21**

**MC-S97-21. Considering that the preparation of appropriate software is a critical component in the successful development, utilization and interpretation of many of the CCSDS Recommendations; and**

**Recognizing that many Agencies are currently constrained by software export policies so that they are unable to freely share software developed in conjunction with a written CCSDS Recommendation, CCSDS resolves to:**

- a. Require that all proposed CCSDS New Work items include a specific plan for the development of associated software, prior to their approval. Such a plan must identify the Agencies participating in the task and identify the specific benefits of sharing software, such as the quid-pro-quo advantages of cooperative sharing.**
- b. Produce a written request to the participating Agencies, upon approval of a New Work Item, asking that software produced in conjunction with the Work Item be freely distributed among the participating Agencies.**
- c. Ask the participating Member and Observer agencies to use this written request to seek exemption (as necessary) of this software for its free and unrestricted use by the participating Agencies.**
- d. Instruct the Secretariat to prepare, for Management Council consideration, proposed revisions to the CCSDS Charter and the CCSDS Procedures Manual to the affects noted above.**

**ATTACHMENT W**

**PROPOSED CHANGES TO THE TSG CHARTER**

## CCSDS TECHNICAL STEERING GROUP

### CHARTER

(Terms of Reference)

(August 1996)

#### Purpose

To ~~develop and~~ coordinate the overall technical ~~plan of work~~ activities for of the CCSDS.

#### Scope

~~Update~~ Identify and maintain the overall technical requirements for CCSDS activities derived from the needs of future space projects and technology programs.

~~Adapt the existing overall work plan to these requirements.~~

~~Support the establishment and the~~ Perform periodic review of the technical work ~~plans of of~~ the CCSDS panels.

Develop an architecture model to ~~E~~nsure the harmonization of ~~the panels' activities in terms of detailed activities schedules, technical interfaces, technical terminology, storing sharing of resources, and the schedule of meetings.~~ CCSDS Recommendations.

Prepare technical exposes of CCSDS activities for presentation to the outside world.

#### Organization

~~Members will be all panel and subpanel chairmen. Others may be invited as required. Agency representatives are invited to attend as appropriate.~~

Membersships of the TSG includes are all panel chairmen and working group/subpanel chairmen.

At the invitation of the TSG Chairman, agencies ~~Agencies are will encouraged to~~ send experts for clarification of technical subjects as required. ~~MC Members may attend as well.~~

The TSG Chairman will be appointed by the Management Council. ~~one of the panel chairmen.~~

The operating procedures shall be in accordance with the CCSDS Procedures Manual.

**ATTACHMENT X**  
**DRAFT VISION STATEMENT**

*Consultative Committee  
for  
Space Data Systems*

**CCSDS:**  
*Vision  
Change Goals  
Mission  
Approach*

**Review Draft 2  
May 1998**

*Prepared by:  
Adrian J. Hooke, NASA Space Operations Management Office*

## ***Vision***

The vision of the CCSDS is to be the world leader in developing the standardized data handling techniques that facilitate the seamless integration of space mission information systems with the global information infrastructure. By realizing our vision we will enhance the international exploration and utilization of space while simultaneously realizing significant cost savings for all participants.

## ***Change Goals***

Our change goals are to achieve the following by the year 2005:

1. At least ninety percent of all space missions that are executed across international space community will be using CCSDS data handling standards.
2. Using our standards, a space project organization will be able to implement its space mission information system (a) at less than twenty percent of the cost, and (b) in less than half the time than would have been required to build such a system when CCSDS was formed in 1982.

## ***Mission***

Our mission is to provide the forum whereby the international space community - space agencies and their industrial partners - can reach voluntary consensus on solutions to common problems associated with the design of space mission information systems. The fruits of that consensus will be made available to the space community in the form of new international standards supported by hardware and software that facilitate their adoption. We will therefore provide the environment and infrastructure whereby:

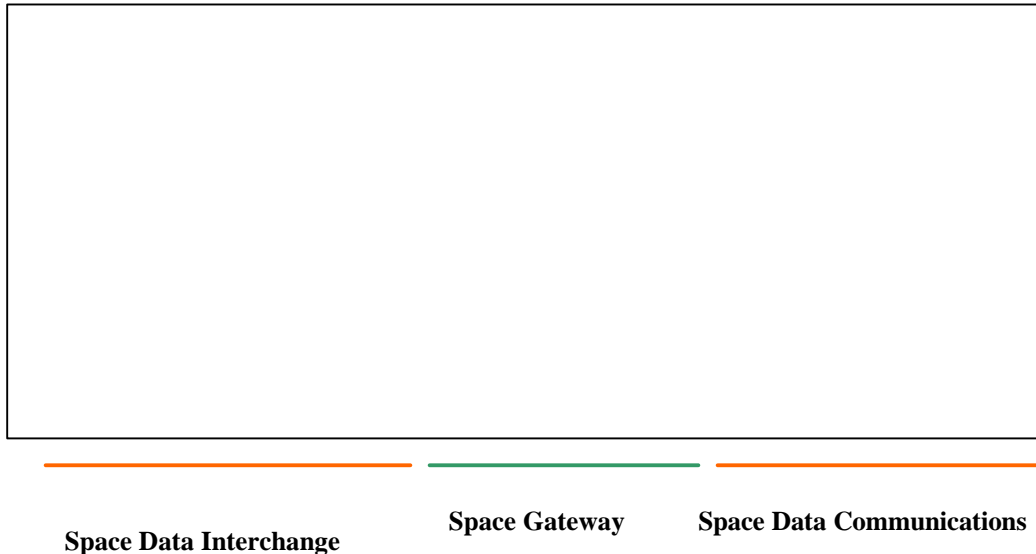
- The international space community will openly discuss common problems associated with implementing space information systems so as to identify where standard solutions will be beneficial.
- Technical experts within that community will be provided with the resources required to develop the necessary voluntary, consensus standards.
- The community will formally review and comment on those standards as their development progresses, and will approve their publication when complete.
- The recommended standards will be made freely available for adoption and use across the international space community.
- Technical resources will be provided to assist with their assimilation and implementation.

In executing this mission we will:

- Advocate the use of current global information infrastructure standards where advantageous.
- Develop new critical space standards where current standards are inadequate.
- Open the standardization process, on a voluntary basis, to all interested parties across the government, private sector and academic space communities of the world.
- Use experimentation and demonstration as integral components of developing new standards.
- Encourage partnerships between space agencies and the private sector to produce off-the-shelf hardware and software so that the standards can be used to build space mission information systems that are scaleable, fast to integrate, and low-cost.

## ***Approach***

We will promote standardization across three space mission operations service domains that are shown below:



- ***Space Data Communications Services*** that allow user applications to exchange information through the data networks that interconnect the space and ground segments of the mission operations system. These services will allow deployment of applications into space that are functionally as close as possible to their counterparts in the global information infrastructure, and will confine "space uniqueness" to areas of the intervening communications system that are invisible to users.
- ***Space Gateway Services*** that are needed to interface the space data communications services with the ground segment of the operations system. Gateways may be required because, for reasons of protocol compactness and efficiency, the raw space communications services are often not designed to independently traverse the ground segment.
- ***Space Data Interchange Services*** that allow users to access and exchange space mission information across a data network. While such exchange often occurs wholly within the ground segment of the operations system, it is possible to extend the space data interchange services into the space segment by running them over the space data communications services via the gateway services. CCSDS space data interchange services will only be developed in areas where the global information infrastructure cannot meet space mission needs.

In each of these service domains we will form a technical panel to develop the necessary standards. Each panel will implement a policy of cleanly layering its standards so that they are functionally independent of each other and can individually be evolved to meet changing mission and technology environments.

The work of the technical panels will be synchronized by a roadmap that shows how the vision and change goals will be accomplished by progressively deploying new standard capabilities.

-o-o-o- end -o-o-o-

**ATTACHMENT Y**  
**AGENCY CCSDS UTILIZATION QUESTIONNAIRE**

## QUESTIONNAIRE I: USE OF CCSDS RECOMMENDATIONS FOR AGENCY STANDARDS<sup>(1)</sup>

**Agency:**

**Page      of**

**Title and Reference of Standard:**

**Subject of Standard:**

**Status of Standard:** (1) under preparation, (2) approved, (3) applied (see Questionnaires II and III)

**Related CCSDS Recommendation(s):** (see list attached)

**COMMENTS:** Should in particular contain information on which parts of the recommendation have been taken into account; this part will later be replaced by formal conformance proformas or options matrices

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<sup>(1)</sup> In case of need for clarification on the significance of specific questions contact Klaus Lenhart by  
E-mail [klenhart@esoc.esa.de](mailto:klenhart@esoc.esa.de)

## LIST OF CCSDS BLUE BOOKS TO BE USED FOR THE COMPLETION OF THE QUESTIONNAIRES I, II and III

TITLE	DATE	REFERENCE
Telemetry Channel Coding	92-05	101.0-B-3
Packet Telemetry	95-11	102.0-B-4
Packet Telemetry Services	96-05	103.0-B-1
Lossless Data Compression	96-11	121.0-B-1
Telecommand Part 1 - Channel Service	95-11	201.0-B-2
Telecommand Part 2 - Data Routing Service	91-11	202.0-B-2
Telecommand Part 2.1 - Command Operation Procedures	91-10	202.1-B-1
Telecommand Part 3 - Data Management Service	87-01	203.0-B-1
Time Code Formats	90-04	301.0-B-2
Radio Frequency and Modulation Systems	96-05	401.0-B
Advanced Orbiting Systems, Networks and Data Links: Architectural Specification	92-11	701.0-B-2
Advanced Orbiting Systems, Networks and Data Links: Audio, Video and Still-Image Communications Services	94-05	704.0-B-1
Standard Formatted Data Units - Structure and Construction Rules	92-05	620.0-B-2
Standard Formatted Data Units - Structure and Construction Rules - Corrigendum	96-11	620.0-B-2.1
Standard Formatted Data Units - Control Authority Procedures	93-06	630.0-B-1
Standard Formatted Data Units - Control Authority Data Structures	94-11	632.0-B-1
Parameter Value Language Specification (CCSD0006)	92-05	641.0-B-1
ASCII Encoded English (CCSD0002)	92-11	643.0-B-1
Cross Support Reference Model Part 1: Space Link Extension Services	96-05	910.4-B-1
Radio Metric and Orbit Data	87-01	501.0-B-1

## QUESTIONNAIRE II: USE OF CCSDS RECOMMENDATIONS FOR AGENCY INFRASTRUCTURE<sup>(2)</sup>

**Agency:**

**Page      of**

**Name and/or Reference of Facility:** Ground station, system control centre, payload control centre, data centre, etc.  
on-board standard HW and/or SW

**Element of Facility and its Function:**

**Correlation with applicable Agency Standard(s) (if any):**

**Correlation with applicable CCSDS Recommendation(s):**

### COMMENTS:

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<sup>(2)</sup> In case of need for clarification on the significance of specific questions contact Klaus Lenhart by  
E-mail klenhart@esoc.esa.de

## QUESTIONNAIRE III: USE OF CCSDS RECOMMENDATIONS FOR AGENCY MISSIONS<sup>(3)</sup>

**Agency:** \_\_\_\_\_ **Page** \_\_\_\_\_ **of** \_\_\_\_\_

**Name of Mission:** \_\_\_\_\_

**Characteristics of Mission:** Objectives, payload, orbit etc.

**Space-Ground Link Terminals/Systems for Platform and for Payload:** Ground stations, TDRSS, etc., correlate with information in Questionnaire II, if applicable.

**Control Centre(s) for Platform and for Payload:** Location(s), functions; correlate with information in Questionnaire II, if applicable.

**User and/or Data Centre(s):** Location(s), functions; correlate with information in Questionnaire II, if applicable.

**Operation Scenarios:**<sup>(4)</sup> see attached explanations

**Correlation with Agency Standard(s):**

**Correlation with applicable CCSDS Recommendation(s):**

**COMMENTS:**

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(3) In case of need for clarification on the significance of specific questions contact Klaus Lenhart by E-mail klenhart@esoc.esa.de

(4) Information would be most useful for further analysis, but could be left out in the first version.

## CLASSIFICATION OF MISSION OPERATION SCENARIOS<sup>(1)</sup>

For the purpose of this questionnaire the Operation Scenarios are defined by their nodes and links providing the Tracking, Telemetry and Command (TTC) communication. These scenarios are defined by mnemonic abbreviations. An example is EPI-NPf-NG-NC-ED. This means an ESA payload is flying on an NASA platform which communicates with the ground via the NASA ground network which communicates with a NASA control centre which maintains a link with an ESA data centre. The nodes are designated by combinations of letters and the links by hyphens.

The letters have the following meaning:

- E ESA or EUMETSAT; this represents all projects where ESA or EUMETSAT is the sponsor of a platform or a payload (or of both) or the operator of a system.
- N NASA or NOAA; this represents all projects where NASA or NOAA is the sponsor of a platform or a payload (or of both) or the operator of a system.
- Letters for other agencies as required.
- PI Payload
- Pf Platform
- Pf&PI Platform and Payload
- G Ground Network, i.e. network of ground stations
- S Space Network, i.e. ESA's EDRS or NASA's TDRSS
- C Control Centre for platform and overall payload control and/or specific payload control
- CPf Control Centre for platform control and overall payload control
- CPI Control Centre for specific payload control
- D Data Centre (data routing and/or data processing and/or data archiving centre).

The figure on the next page shows the links of all operation scenarios for the example of ESA/EUMETSAT and NASA/NOAA.

"Interoperability Scenarios" are those where the first letter in the pattern and the letters following immediately a hyphen are not all the same. All others are "Agency Scenarios".

On the space side mayor elements are - beside the payloads and platforms - the links via the data relay satellite systems TDRSS and EDRS (here called the space network) and the links to the ground stations (here called the ground network). On the ground side the major elements considered are the control centres and the data centres. Control centres could be those for the platform or the payload only or could assume both functions. Data centres which will normally perform data processing, distribution and archiving, may also be involved in mission planning and quick look processing, but never in real time operations.

A large number of missions pertain to more than one scenario. For example during the early orbit phase a mission may use exclusively ground network and during routine phase the space network or a mixture of space and ground network. The latter is typical for earth observation satellites. Further, a mission may run during certain phases under an agency scenario and during other phases under an interop scenario. Thus it is important to understand, that a scenario is normally related to a certain phase of the mission, and not necessarily to a complete mission. Moreover, even mixtures of scenarii during the same phase are conceivable.

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(6) Method extracted from ESA Study on *Enhancement of International Interoperability*, performed by RSI

**ELEMENTS OF MISSION OPERATION SCENARIOS**

Example: ESA/EUMETSAT and NASA/NOAA

Graphic Not Available

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**ATTACHMENT Z**

**TOP MANAGEMENT ORIENTED MARKETING BROCHURE**

**Top Management Oriented Marketing Brochure  
Agenda Item proposed by  
Principal Delegate, INPE**

(Regarding the topic) initially discussed, back in Oxford, concerning the preparation of a ('high quality') document by CCSDS to be specially, purposely directed and addressed to the aerospace business -top- management. Addressing of agencies included. We all know that aerospace business is also in the process of globalization and of privatization, to a remarkable extent, in terms of products (COTS, especially) and services, as well. Continuing CCSDS active participation in events (SpaceOps, IAF, IAA, etc.) is also important, as-part-of its marketing effort.

**ATTACHMENT AA**  
**NASA IMPLEMENTATION SURVEY LETTER**

## REPORT OF THE MANAGEMENT COUNCIL - MEETING MINUTES

Dear Sir or Madam:

As NASA Head of Delegation to the Consultative Committee on Space Data Systems (CCSDS), I wish to make you aware that the CCSDS organization maintains a document that catalogs known CCSDS-conformant hardware and software products. The purpose of the document is to provide space system designers with information about existing capabilities for space and ground data systems. It is the principal reference work to which the CCSDS refers system designers who inquire about CCSDS-conformant products.

This document is about to be revised, thus, the NASA delegation to the CCSDS is actively seeking additional input from U.S. companies. Your company has been identified as a supplier of one or more CCSDS-conformant products. I invite you to provide my office with information about your CCSDS-conformant product for the purpose of including that information in the next issue of the document.

Attached is a form providing general headings under which relevant information about a given product should be supplied. The headings are provided in the interests of maintaining consistency of presentation. Clearly some headings may not apply to all products, and some products may best be represented by including information under additional headings.

If your company chooses to provide information for inclusion in the document, separate forms should be used for each product identified. Your aim should be to provide clear and concise information in enough detail to enable potential users to determine whether a given product meets their requirements.

While neither NASA nor the CCSDS is chartered to promote the products of private enterprise, it is reasonable to assume that inclusion of products in the CCSDS document is a convenient method of informing potential users of the existence and capabilities of those products.

My address information for submitting information is

Mr. David Townley  
CCSDS Secretariat  
NASA Hq./MG  
300 E Street  
Washington, DC 20546-0001

Sincerely,

David Townley  
NASA Head of Delegation to the CCSDS

## REPORT OF THE MANAGEMENT COUNCIL - MEETING MINUTES

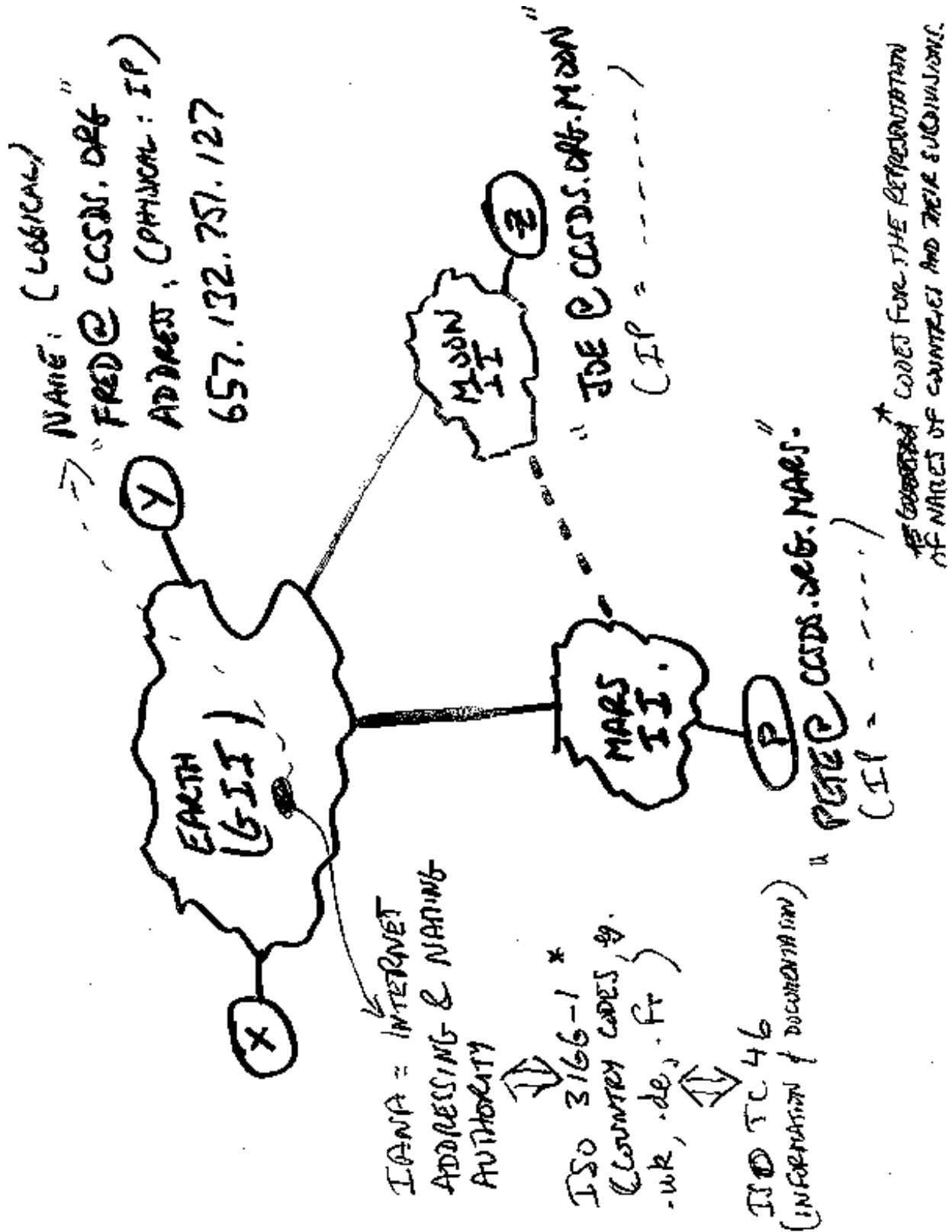
### PRODUCT INFORMATION

- 1 PRODUCT NAME
- 2 PART NUMBER
- 3 PRODUCT TYPE
  - Hardware
  - Software
- 4 CCSDS RECOMMENDATION(S) OR CCSDS AGENCY STANDARD(S)  
TO WHICH PRODUCT CONFORMS
- 5 APPLICABLE DOMAIN:
  - On-Board Data Systems
  - Ground Data Systems
    - o Mission Operations
    - o Space Link Extension
    - o Data Archives
- 6 FUNCTIONAL DESCRIPTION OF PRODUCT IN TERMS OF RELEVANT CCSDS  
RECOMMENDATION(S)
- 7 PERFORMANCE CHARACTERISTICS
  - General
    - o Special performance characteristics
    - o Areas of non-conformance or deviations from relevant  
Recommendation(s)
  - Hardware:
    - o Electronic (as relates to relevant CCSDS  
Recommendation)
  - Software:
    - o System requirements
- 8 PHYSICAL CHARACTERISTICS (HARDWARE)
  - Physical Characteristics
    - o Size
    - o Weight
    - o Temperature Range
    - o Power Requirements

## REPORT OF THE MANAGEMENT COUNCIL - MEETING MINUTES

- o Radiation Hardened (if applicable)
  - Available in:
    - o Commercial Space
    - o Class B
    - o Class S
    - o Engineering Units
  - External Interfaces:
  - Pin Connections
  - Other characteristics
- 9 PROPRIETARY INTERFACES/SYSTEM ENVIRONMENTS
- 10 ILLUSTRATIONS (OPTIONAL)
- Graphic (provided by vendor in common interchange format) illustrating architectural layout, data flow.
  - Photograph (provided by vendor in common interchange format) of product.
- 11 HERITAGE (IF APPLICABLE):
- Previous uses
  - Context(s) for previous uses
- 12 COMPANY NAME
- 13 POINT(S) OF CONTACT/WEB SITE
- 14 ADDRESS INFORMATION/

**ATTACHMENT BB**  
**ADDRESSING**



**ATTACHMENT CC**  
**PROPOSED MEETING SCHEDULE**

# REPORT OF THE MANAGEMENT COUNCIL - MEETING MINUTES

## NASA - CCSDS MASTER SCHEDULE (As of Sept 01, 1998) - Issue 2

		1998	<-	1999								
MANAGEMENT/OTHER	NTAG	SEP		OCT	NOV	DEC	XXX	APR	MAY	JUN	JUL	XXX
	GSFC	09										
ALL SAT CONF	UTAH-03											
ITC 98	San Diego			28-29								
Standards Sess				TBS?								
UK Data Arch	Scotland			15-16								
TSG	ESOC				04							
MC	ESOC				05-06 (AM)							
SC-13	ESOC				06 (PM)							
ROADMAP WG	AUST			21-23								
ISO TC20	VIEN			19-22								
BNSC/IEEE					09							
TSG	Pasadena								TBS			
MC	Pasadena								TBS			***
SC-13	Pasadena								TBS			***
PANEL 1		SEP		OCT	NOV	DEC	XXX	APR	MAY	JUN	JUL	XXX
P1-A TIM	GSFC											
P1 Plenary	ESOC			TBS								
P1-A IWS	ESOC			19-21								
P1-E	TBD			TBS								
Joint P1-A/E	TBD			TBS								
P1-F	CNES			14-16								
P1-A/E/F	ESTEC			12-13 ??								
P1-J	ESOC				02-03							***
P1-A IWS	Pasadena								TBS			***
P1-E	TBD								TBS			***
Joint P1-A/E	TBD								TBS			***
P1-F	Pasadena								TBS			***
P1-J	Pasadena								TBS			***

# REPORT OF THE MANAGEMENT COUNCIL - MEETING MINUTES

PANEL 2		SEP	OCT	NOV	DEC	XXX	APR	MAY	JUN	JUL	XXX
FOLLOW-ON DADS SYMP					TBS						
NASA/Europe TC	01	<-----Planned Monthly----->									
DA US #13	ARA	16-18									
P2 IWS	TBS		26-30								
P2 DA #7			TBS								
ADPU CONF	VA		26-28								
DA US #14	TBD		TBS								
P2 IWS	Pasadena							TBS			***
P2 DA #8	Pasadena							TBS			***
PANEL 3		SEP	OCT	NOV	DEC	XXX	APR	MAY	JUN	JUL	AUG
VIDEO CONF		14	13	13	14	22	19	19	19	18	18
P3 IWS	ESOC		26-30								
P3 IWS	Pasadena							TBS			
***											

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